The
TOOL ENGINEER

Official Publication of the
AMERICAN SOCIETY OF TOOL ENGINEERS

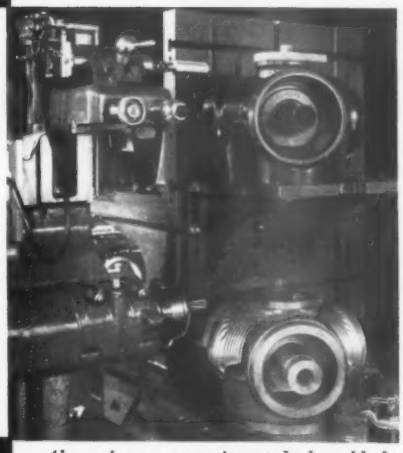
The Three-Spindle Keller Machine is ideally suited for the production of multiple parts with irregular outlines. In the illustration at the left the finished connecting rods on the machine table were profiled three at a time from solid bar stock. The tracer follows the template outline for machining the outer edges. A second template is then mounted on the fixture pins for machining the inner channels. The average total time per piece for machining the outer edge, the bosses on the ends, and the channels on both sides, including handling time, is two hours, 33 minutes.

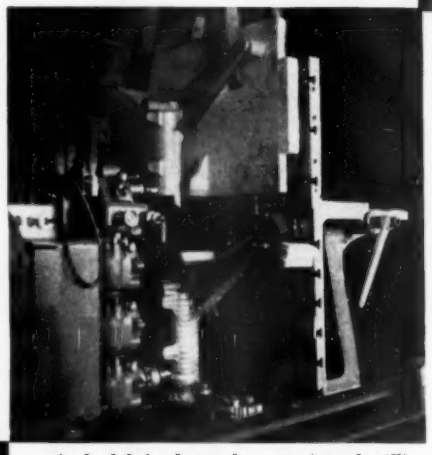
The men who build aircraft use the KELLER Machine!

THE Keller Automatic Tool Room Machine, because of its versatility, is now in use in almost all the major aircraft plants of the world. Because it can reproduce complicated shapes easily, it has solved many difficult aircraft problems. Engine parts, propeller hubs, landing gear components, and many other parts have been worked out experimentally on this machine, and later the complicated dies have been produced accurately in the same way, ready for production.

The operating principle of the Keller Machine is the accurate reproducing in steel of a master shape made of wood, plaster, cement or similar materials. Under electric control a tracer glides lightly over the model's surface, or rides around the profile of a sheet metal template, while the milling cutter reproduces this shape accurately.

For quick, economical, accurate production of complicated experimental parts, finished dies and a long list of similar parts, the Keller Machine is the ideal method. Write today for complete information.





Above is an experimental three-blade propeller hub as it appears after the roughing cut on the Keller machine. The circular bosses and shafts were first turned on a lathe from a solid block of steel. This then was mounted on the Keller machine and the connecting surfaces were produced under the control of the tracer which follows the contour of the wooden model mounted above. To obtain uniform cross section, the work piece was indexed for each surface, so the same section of the model was reproduced three times.

At the left the Keller machine is producing an experimental landing gear part which it is cutting from a solid steel billet using a wooden model as a guide. When this piece is removed from the Keller machine it will be the equivalent of the forging eventually to be produced with dies. This piece can be checked for stresses and strains and used to lay out subsequent machining operations.

At the left is shown the operation of milling bevel gear openings in a speed reducing unit. The width of the openings must be held to close tolerances. A simple outline template controls the movements of the machine, while the angular position of the opening is produced by the fixture holding the work at the correct angle with the cutter spindle. The total time for machining these six openings, including set-up time, is three and one-half hours. Previous performance was two and one-half days.

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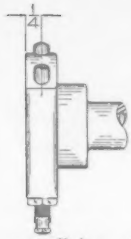

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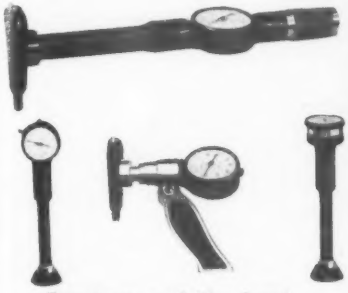

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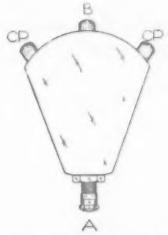

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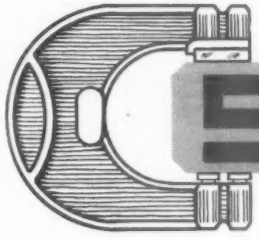

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The Tool Engineer

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Contents

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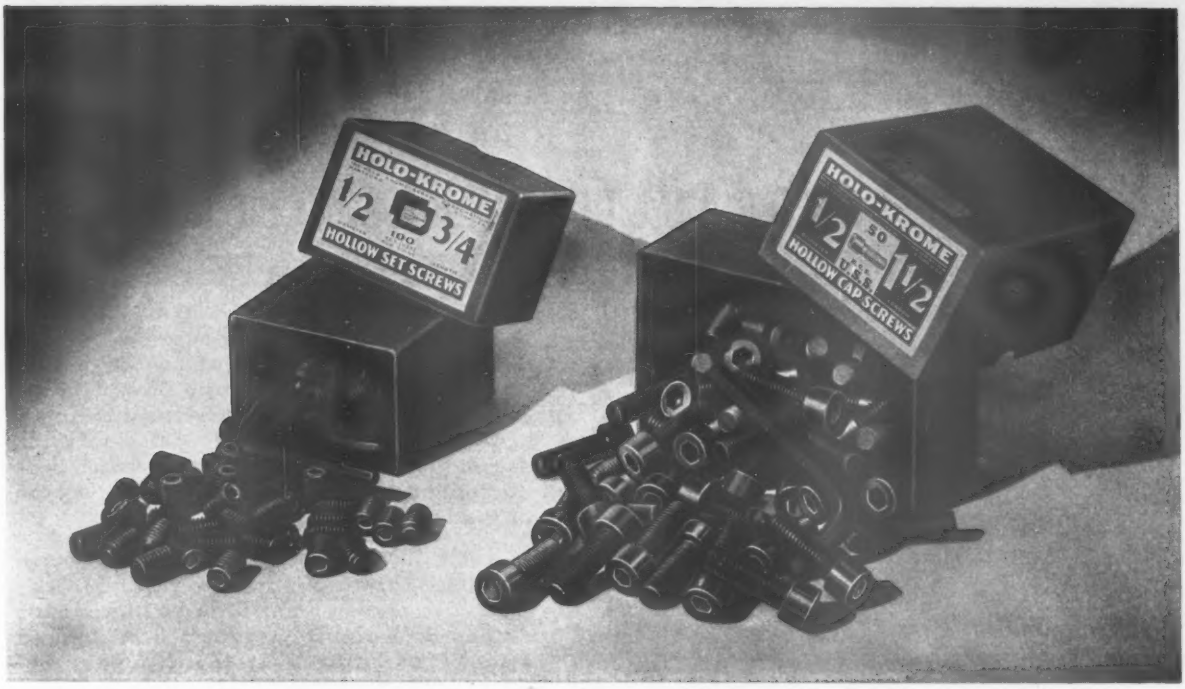

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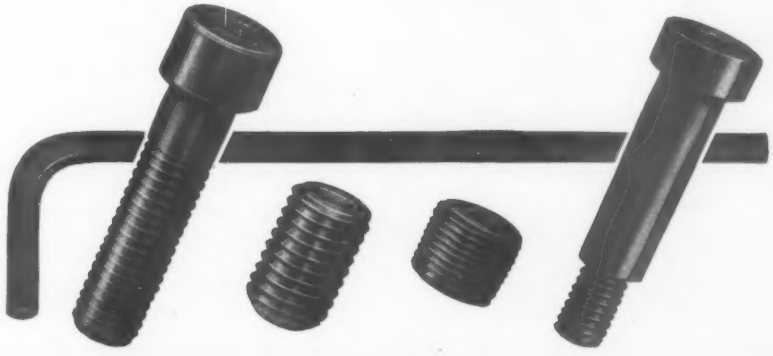

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The Munitions of Peace

WHEN industry plans manufacturing programs, it looks to Tool Engineers for production tools. When a nation prepares for war, it turns to the same creative body for the machinery of destruction—for weapons of offense and defense. In war as in peace, Tool Engineers are the key men in the scheme of mass manufacture; in emergency, they can divert their talents from the fields of peace to the arena of war. But it is peace that we speak of here, since war of itself serves no useful purpose, resolves few issues with any degree of finality. It is not even a means to an end in this modern age, when even the victor suffers irretrievable losses.

Essentially, Tool Engineers are committed to peace, with its stabler if less dramatic prosperity, its comforts and mass happiness. One home built is worth a city destroyed; one automobile that gives pleasure to a family is worth a thousand tanks designed to maim and kill; one pleasure craft, skimming peaceful waters, is of far more value to civilization than the mighty battleship plowing through the waves. The munitions of peace promote humanity; those of war create misery, result in bitterness, in moral and spiritual degeneration.

Now this is not a case for pacifism. That we may insure peace—or, at least, respect for our neutrality—let us arm for defense. But, let us also prepare for the dull years that will envelope Europe with the cessation of hostilities; more, let us anticipate a quick truce rather than build on a prolonged war. Certain aspects of this war lead one to a belief that news of truce may be flashed at any moment, in which case a premise built on war profits would suddenly collapse. There is, too, a not so remote possibility that, for self-preservation, western Europe may have to forget its differences in face of a common threat from the east. That, of course, would change the situation, only we'll not bank on that. Rather, let us turn to the tooling for the munitions of peace; instead of planning destruction, let us consider the reconstruction of our own domain, not yet recovered from a previous interference in European affairs.

As our European trade now suffers because of war, so it will suffer when peace finally comes. Fertile fields for American goods are now being industrialized, as in Russia—and Germany can exist only through export of manufactured goods. We face a dwindling market overseas. It is time, then, that we build up our own resources, that we make us sufficient unto ourselves. Coincidentally, we can foster our friendly, reciprocal commerce with Canada, can promote commercial relations with our co-sharers of the Western Hemisphere below the Rio Grande. Pan-American highways will, eventually, interlace the Americas into a close unit with interlocking interests. The Pampas need tractors and agricultural machinery just as much as our prairies, and South Americans can use radios, refrigerators, washing machines, and household appliances. True, we may not take their beef and grain, being (potentially) able to raise our own, but we can take fruit and exotic luxuries, giving in trade the products of our factories. Let us promote those markets; let us build friendships with *the munitions of peace.*

An editorial, written especially for this issue of THE TOOL ENGINEER, by A. E. Rylander.

Who is this Man?

"Salesman" some might call him—"Sales Engineer" probably best describes the type of work he does. To you he's probably just "the *'Greenfield'* man." Perhaps you know him so well you can name him—for this actual photograph could have been taken in any one of hundreds of the country's leading plants.

The important thing is that he is one of 30 odd members of *"Greenfield's"* outside staff—outside our plant—but *inside* yours —men who know *"Greenfield"* tools so well, and know so many ways of getting the most out of them that they are in customers' plants day after day. Their main job is to see that customers get the highest possible returns from their investment in *"Greenfield"* tools.

TRAINED ENGINEERING SKILL COMES WITH THESE TOOLS

The minute you buy any of these tools you get the services, free, of an experienced consultant who works directly with you like the man at the top of the page who is demonstrating the correct way of setting an "Acorn" Die.

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CLEVELAND MEETING

Attended by Enthusiastic Tool Engineers from Everywhere

Enthusiastic Tool Engineers from coast to coast, from all sections of the country and from Canada, attended the American Society of Tool Engineers' Semi-Annual Meeting in Cleveland, Ohio, October 6th and 7th. In the picture above are Louis Biehler (left) of Los Angeles and Arnold Thompson, Toronto, Ontario, Canada.

DESPITE wartime clouds, ominous threatenings, tooling programs in major plants, and the cancellation of the Machine Tool Show, Tool Engineers from all sections of the United States and from Toronto, Canada, came to Cleveland to attend the Semi-Annual Meeting of the American Society of Tool Engineers—October 6 and 7, with genial Jim Weaver, President, presiding.

It was not as large a crowd as would have been there had the Machine Tool Show been held as scheduled, but it was a very enthusiastic group, representing every chapter of The Society. At least 28 chapter chairmen were present as well as many ardent members and committee workers, who while unusually busy at home, came nevertheless to attend the national meeting and to carry back the worthwhile information, data, and technical material to other thousands of Tool Engineers who make up the membership of A.S.T.E.

There A.S.T.Eers met old friends, had little get-togethers in hotel rooms, warmly greeted old pals they hadn't seen since the last A.S.T.E. meeting and best of all there were the splendid technical sessions, the address by Hon. Hamilton Fish, and Prof. John Younger's second report of his Fact-Finding Committee. These were some of the highlights that those who did not attend, missed. Plant tours to some of Cleveland's outstanding Machine Tool factories were another feature of the meeting.

Chairman G. J. (Jack) Hawkey of Cleveland, the host chapter, had "engineered" a splendid background of hospitality and had seen to it, with his various program and arrangements committeemen, that all events of the meeting went off on time and on schedule. His able assistant, G. V. Briner, deserves much credit for services in arranging plant tours and other events. The entertainment provided by Cleveland chapter for Semi-Annual dinner, Friday evening, deserves special mention as it was highly pleasing, entertaining and interesting to the three or four hundred Tool Engineers who attended it.

Many A.S.T.Eers were to be seen about the lobby Thursday evening. Walking down the main street—Euclid Avenue — one was bound to meet many, who had arrived early so as to be sure to be on hand bright and early next morning for the opening events of the two-day program. Friday morning, the large majority arrived. Each Chapter Chairman reported that Tool Engineers were unusually busy so that many found it impossible to attend the meeting. The first day was devoted to plant tours through the plants of Warner & Swasey, Acme Machinery Co., White Motor Co., Cleveland Graphite Bronze Co., National Acme Co., Parker Appliance Co., National Screw & Mfg. Co., Republic Steel Corp. The highlight of the whole convention was the annual dinner Friday evening when the Hon. Hamilton Fish, Congressman from New York State addressed the assembled Tool Engineers with a message so well received and acclaimed by those present that it has been talked about ever since. For the benefit of those unable to be present a report of his address is given elsewhere in this issue of "The Tool Engineer." Professor John M. Younger's Second Report of the A.S.T.E. Fact-Finding Committee on "The Effect of the Machine on Employment and Our Standard of Living" gave further valuable and highly interesting data which had been ascertained by his committee through their work of the last six months. A report of this paper is also given in this issue.

Technical Meetings

The technical session on Saturday morning, attended by approximately 150 Tool Engineers, was a Symposium on Bearings. Many more or less controversial points relative to plain and anti-friction bearings were discussed to the enlightenment and interest of the Tool Engineer. Eugene Bouton, A.S.T.Eer of Racine, Wisconsin, Karl Herrmann of South Bend, Indiana, S. R. Thomas also of South Bend and S. L. Crawshaw of Pittsburgh, each presented prepared papers on various phases of the subject of bearings. These will be given in the December issue of "The Tool Engineer." The session was marked by the genuine interest of those in the audience and by the lively discussions which followed each paper as well as a lengthy, general discussion following the last paper presented. Cleveland Chairman G. J. Hawkey acted as chairman of the session.

New York City, Host to 1940 Meeting

By six p.m. Saturday evening nearly all had departed for home. Those who remained Saturday afternoon were officers and committeemen, many from the New York - New Jersey Chapter, who stayed on to make plans for the next National Meeting of A.S.T.E. which, it was decided by the Board of Directors, will be held in New York City.

THE AMERICAN "WAY" IS BEST

The Hon. Hamilton Fish, Congressman from New York State, (left) and J. B. (Jim) Weaver, President of the American Society of Tool Engineers. Both appear to be in deep conversation — just preceding the address by Congressman Fish and reported on these pages. (TOOL ENGINEER photo)

AN ADDRESS BY
THE HON. HAMILTON FISH
SEMI-ANNUAL DINNER,
AMERICAN SOCIETY OF TOOL ENGINEERS,
CLEVELAND, OHIO, OCTOBER 6TH, 1939

I DON'T see that there is very much for me to say after listening to Professor Younger's admirable report on mass production and the part played by the Tool Engineers. I think the professor settled about all the problems in the country, yours and the public's and the manufacturer's and the engineers'.

I am happy, however, to talk to this group of hard-headed, clear-thinking, intelligent, professional and business men. I am not at all sure that you don't need more talking to in these days, or up-to-now days, of depression for the last seven years, than other groups. You have been more or less on the defensive, and you have permitted all the radicals and Communists and Socialists to tell us that everything was rotten and wrong in America, that everything of the past, politically, and particularly industrially, must be scrapped for these new-fangled ideas from abroad.

The business men have, more or less, been on the defensive. After all, we are a young country. We are only approximately one hundred and fifty years old. When Thomas Jefferson wrote his famous Declaration of Independence, it was a mere scrap of paper, until George Washington came along, and through his leadership and his courage and his determination and his faith, translated it into our republican form of government, into what is today our actual form of government, and under our Constitution, the oldest single form of government in the world.

Nevertheless we are in the morning of our destiny, in spite of depressions. We have all the same natural resources that we had back in 1929. We have the same loyal labor, we have the same intelligent, hard-headed, hard-working business and professional men. We are in the morning of our destiny, and I say to you, at the outset of my remarks, that if there is any country worth living in today it is the United States.

Now these radicals whom we have let go unanswered love to go to our colleges, men's colleges and women's colleges, and tell them that all our whole industrial system is wrong, that capitalism is wrong and that labor is exploited in the press and brutalized in America.

An Answer to Radicals

Now what is the answer? The answer is, in the first place, they use this word "capitalism" as nothing but a misnomer. It is nothing but our own industrial or American system, based upon private profit, or reasonable private profit, and initiative, under which our industry has developed into the greatest and richest and our nation the freest in the world. Of course, there are abuses in the capitalistic system, the industrial and American system. There have been for years, but under this system of ours, under our free institutions, whenever these abuses and evils arise the people making their requests on industry, upon the state legislatures, upon the Congress, have remedied those abuses.

There are shorter hours for labor. Someone mentioned here tonight the long hours of labor a hundred years ago. Why there are men and women in this room who can remember twelve, fourteen and fifteen hours of labor in America. But step by step, under our free institutions and the demand of the people, shorter hours for labor, protection in the factories, workmen's compensation laws, old age pensions, child labor laws have come, and there isn't a single evil or abuse that arises in our industrial system that we cannot solve on sound American principles for the benefit of all of our people, without recourse to Socialism or Communism, or Naziism, or Fascism, and we propose to do it that way.

People are Sovereign in America

But in spite of these condemnations of capitalism and of our industrial system and that labor is exploited and brutalized, I say to you, without any fear of contradiction, that American labor is better paid, better housed, better fed, better clothed, more contented, and freer than any labor in the world today, that the destinies of our country are in the hands of free American labor. They are the sovereign people, like you and me and all the rest of America. They control the destiny of this great country, the greatest in the world, and yet we of the business and profession have been on the defensive, and have let this propaganda cover America. But thank God for the intelligence and the common sense of the American people! It doesn't get very far.

There are not many Communists or Socialists in America, a million or so out of one hundred and thirty million. American labor is loyal and patriotic and believes in our institutions. They know they are better off, they know they are free, and that is why they don't go to the left, to Communism or Socialism, and they support the old parties and work in the old parties for the reforms they think are required.

Mass Production Here to Stay

So far as the problem of mass production with which you are confronted, no matter what we may think of it, of its merits or demerits, mass production has come to stay, and will continue to grow, not only in this country but in every country in the world.

I have just come back from Europe, where I was some six weeks, and I went into sixteen countries. Of course, these countries change very rapidly in Europe. I don't know whether you count Danzig as a country or not, but I was there two days before the war broke out, and I was in Austria and other places at that time, whether we count them as countries or not.

In Europe they have mass production. Tool Engineers, of course, are inseparably united with mass production in this country. That is their duty, to make it efficient so they can have this mass production for the benefit of and low cost for American consumers.

Dictators and War Make for Mass Production

I listened, as I say, with great attention to the report that has just been made to you, and agree with ninety per cent of it. Mass production has come to stay in foreign lands. The dictatorships abroad have made for mass production much more rapidly than almost any other nation. If you go through England, France or Germany today, you will see factories miles long for munitions and airplanes. War makes mass production.

There is no use arguing about that situation. It is an accomplished fact, and it will, I think, continue to grow. What it finally means, I am not prepared to say. I do believe in it. I believe it brings better goods and cheaper goods to the public and puts money in circulation. It certainly has brought shorter hours and may continue to bring even shorter hours, whether we like it or not. Some employees, of course, won't like it. Some of the wage-earners will like it. I think if mass production grows, we will continue to have even shorter hours than we have now. That is in the future, and it is more of a prophecy. I am not advocating it.

So we have this situation of mass production which confronts the whole country, and the whole country might as well make up its mind; it is here to stay. You are doing a job and by your efficiency getting better and cheaper goods to the public.

It is very hard for me to speak without being a little partisan once in a while, because it is true that I come from the same district as the President of the United States, as was said here tonight, but I want to assure you I am not here this evening as his spokesman. I believe in a program of abundance and mass production. I don't believe in the New Deal program of scarcity. You remember the President said that he was going to give the people "a more abundant life," and I am afraid he gave them more abundant promises and debts and deficits and unemployment. I don't believe in the destruction of crops, the ploughing under of cotton and the birth control of pigs.

Whenever I find two or three fellows clapping, whenever I find at least three Republicans together, then I know we still have a party.

That is really an economic issue, not so much a political issue.

Our "Experiments"—a Failure

I think a great many people, although they went in for the experiment, have come to the conclusion that the program of scarcity in America, the greatest nation in the world, with all our farm products and natural resources, is a failure, particularly a failure after five or six years of experiment with the farm situation.

We have been spending from half a billion to one billion dollars a year to solve this farm program of scarcity and reduction of crops and ploughing under, etc. The answer is very clear, gentlemen. Cotton today is selling at 8c or 9c, after all these years. If I may be partisan for a minute, under a Republican administration, those terrible, wicked Republican administrations, cotton sold in the Southland, from 1920 to 1930, for 17c a pound at an average. For a number of years past it has been selling at 8c a pound, and yet we had this program of destruction.

That is not half the sad story. We have lost over half of our export crop in cotton to the world markets from eight million bales to less than four million bales this year. The same applies to corn and wheat, on down the line. It has been a failure.

That is one reason I believe in mass production and more abundance in this country. I think that will go a long way toward solving a lot of our problems, further than any program of scarcity.

Now I am going to speak, with the permission of your chairman and others with whom I discussed the issue today, of something on the foreign affairs. You have heard so much about mass production in your own business, it is not for me really to go into detail.

I have just come back from this trip abroad. For twenty years I have been a member of the Committee on Foreign Affairs in the House of Representatives. I am to some extent the spokesman of my party on international issues in the House of Representatives.

I went over there as Chairman of the Committee, or President of the American Group of Interparliamentary Union, and traveled around extensively and met most of the foreign ministers of France and England and Germany and many others.

Nothing Settled by War

Nobody in this country or anywhere else loathes and abhors war any more than I do. I served in the World War in France. I came back with that conviction, and it has grown on me all the time, that war is an utter futility and the victor no longer wins, that he loses just the same as the victim. Nothing is settled by it. I will go to any lengths in the world to promote peace and keep America out of all foreign wars.

On my visit to France—and this is really for your interest, I don't know that there is anything profitable in what I am going to say—I went to a little dinner (about August 10th) that Ambassador Bullitt gave near Paris, in his chateau at Chantilly. I believe he gave this dinner to me, a small dinner of about twelve.

At that dinner there was the head of the French Air Force, the Air Minister, a most charming individual by the name of Guy La Chambre, only thirty-seven years of age, a war veteran, decorated in the World War, who talked English most fluently. After the dinner I went into a separate room with him and had a long talk of well over an hour. He practically told me then that this war was going to break out. He told me that France was prepared, Germany was prepared, that war was inevitable, and that war would break out soon after August 20th. I ridiculed it and tried to disabuse him, but he presented his arguments. Of course, he knew the situation perfectly, and I couldn't offset practically anything he had to say. I almost came to the belief then, as much as I hate war, that there was a pretty good chance of war.

I told him I was going to see Von Ribbentrop three days later. I told him that before he spoke to me. I saw Von Ribbentrop at his villa at Salisbury and had over an hour's talk with him. He is also a young man, of forty-five years of age, good-looking, nice personality, talks English as well as any of us, spent six years in America in the railroads out west in the construction business, and he, too, was very frank. He wouldn't talk peace with me at all. That is the only thing I was interested in. He said Germany was prepared, that war was inevitable, that they couldn't come to any agreement with Danzig, that these commotions and this propaganda he gave me were occurring there, and Germans were being killed, and so on, and practically told me that war would break out any time after August 20th. He even went so far as to say, "If war breaks out, we will overrun Poland with our mechanized troops in two weeks' time."

I said, "You mean two months, don't you?"

He said, "No, I mean two weeks' time."

I came away from meeting these two sides, of course, very badly impressed. The whole idea before I went over there was that there wouldn't be any war. I have to admit that; I didn't think there would be any war.

When I went on to Oslo, I gave out a statement there, when the reporter asked me, that I thought, unfortunately, war would break out sometime after August 20th. I was attacked in almost every paper in America as an alarmist, a charlatan, and every other word they could think of.

Now, of course, those papers have all apologized, but lots of them think I have pre-visioned and was a prophet. No such thing! I didn't believe in war when I went over; I didn't believe it was possible. I think it is a madness and something I can't conceive of even today, yet I was simply told this war was going to break out.

One of the troubles with this situation in Europe, one of the reasons I am so much opposed to getting into it, is that they have a system over there, a most unfortunate system. They may tell you it is necessary, but thank God, we haven't got it in America.

A System of Conscription

They have a system of conscription, where they conscript the youth of those countries, Germany and France, to serve in the armed forces. They are trained to arms. Year after year, they build up these gigantic armies, and sooner or later they develop a psychology that war is inevitable, that war is natural, and that the only way out is war.

There wasn't any peace element in any of those countries—England, France or Germany. If there was, I couldn't find it. To talk peace was defeatism in any one of those three countries. And that is the horror of the situation, with the net result that there wasn't anybody working for peace. War was the natural order of the day.

Now I am going to speak to you about our own situation. I want to speak as an individual not even as a ranking member of my own party, because there shouldn't be any politics in it. I know some of you won't agree with me. I think you will all agree that what I say is sincere and from the heart, and from my record of over fifteen years advocating this cause.

I want to say to my Canadian friends, if they may disagree with what I have said, although I am an isolationist, an isolationist from war, I am not an isolationist, of course, for peace and peace conferences and limitation of arms, and so on. I want to say to my Canadian friends here, before I discuss this issue of neutrality, that I think I represent the sentiment of the American people in saying this, and I say it as an isolationist, that if any foreign nation attacks Canada the United States will go to war immediately.

I even go as far as to say that is the same thing as upholding the Monroe Doctrine, which is one of our traditional policies. I believe if any nation attacks or invades or tries to invade any of the nearby countries to the United States, or South America, within a thousand or fifteen hundred miles, we will go to war.

Neutrality?

We have before the Congress at the present time this neutrality business. There is a great misunderstanding about it. In the first place, the House of Representatives—and people don't even know we have anything to do about it—passed the Neutrality Bill at the end of last June. The Administration tried to take out the Arms Embargo, which had been written in in time of peace for the last three or four years, since 1935, so they reported out a bill on the Foreign Affairs Committee taking it out, and we proceeded, although there is a ninety Democratic majority in the House of Representatives, to put the Arms Embargo back in the bill, after a long debate, by a vote with a majority of forty-one. That sent the bill automatically to the Senate, and now they are trying to take the Arms Embargo out in the Senate, and they will probably take it out. Senators like to talk, and of course it is a good opportunity for them to talk, but it will probably come back with the Arms Embargo out for the final decision in the House, and it will be very close.

I want to speak now just for myself, because I don't want to bring in a controversial issue. I know there are two sides, and I know how some of you feel. I have opposed the traffic in arms and was probably the one who first brought it up fifteen years ago. I have tried to put the Arms Embargo into the bill. I have done it because I believe that traffic in arms is immoral, unchristian, vicious, whether in peace or war, particularly in war, for blood money and war profit, to make this the potential slaughterhouse of the world, to drag us into European wars.

Now those who want to favor that—and perhaps the sentiment of America is that way—if they want to go to war, that is all right, if they want to make that the clearcut issue, but these halfway measures all lead to war. They led to war back in 1917. I helped follow the arms traffic to the battlefields of France on the old slogan of "making the world safe for democracy." What a farce! What a tragedy! To think that these old nations of the world have gone to the right and to the left, of the Communism and Naziism and Fascism, and all kinds of dictations.

The Real Issue of Arms Embargo

But on this arms traffic, merely on that basis, that the traffic itself is an immoral traffic for blood money and war profit, to endanger the peace and security of America, that is the issue before the country and nothing else.

There are two or three groups that want to do away with it. There are those who have the profit mania, who would like to see speculation on the stock exchange and old Bethlehem Steel days, and those during the World War, and those booms. I just can't understand it.

I would no more vote to dig a grave for one soldier in France for all the war profits that could come to America! Not one single one!

In my district I can see where the opposition comes from. I have had something like 1200 letters, 90 of them to do away with the arms embargo. They all come, not from the people on Main Street, not from the wage-earners and the farmers of my district, or the small business men, they all come from the social centers and the rich centers of my district, from families who have traveled abroad and lived abroad and intermarried abroad or play the stock market. That is one element that wants to do away with it, particularly in the East, where we have all these international papers every day pleading that side of the case and none the opposite.

Then there are those who are utterly sincere, right in my own family, my own sisters, who want to do this and who would be glad to follow the arms traffic into war, would be glad to send our soldiers to war. That is a perfectly sincere proposition, and it ought to be put before the people whether they want to go to war or whether they don't want to. If we want to go to war we ought to send them everything right off the bat. If we want to stay out of it, stay out of it.

Let's go a little further in this Neutrality Bill. There is so much misunderstanding, even among hard-headed, intelligent business men like yourselves. The Allies can buy everything they want from us, too, except arms. They can buy all the steel and copper and wheat and corn and every other commodity right now from us. It is my honest belief that they don't want our arms and ammunition; they don't want it because they have built these enormous factories, and they have thousands and hundreds of thousands of women employed making shells in France and in England.

They do want our airplanes. The House of Representatives, in passing the Vorys Amendment to the Arms Embargo, left off airplanes. They confined it entirely to arms and ammunition, and left off implements of war, airplanes if they haven't got gun racks and bomb racks. That was in the Senate today.

I am willing to make it cash and carry, as long as it isn't credit. I don't think we want to finance any more wars. We financed one, and we are out about twelve billion dollars. As long as it is really cash and carry, I have to admit I believe so much in the profit system. I believe in the profit system. I will tell you what, gentlemen, I have debated with Norman Thomas six times—Socialism against Capitalism—but if they change this Arms Embargo and sell arms for war profit and blood money, then I am in favor of having the Government own and operate all the munition factories in our country, every one of them. You couldn't do more to destroy the profit system than sell these arms and ammunitions at the present time, because everybody who doesn't like the profit system, all Socialists and radicals, will use that as the main weapon against our entire industrial system.

That is just a side issue. Getting back to this Vorys Amendment that is in the Senate, I like the profit system so much that I want our merchant marine —I am frank to say—to make some profit. I am frank to say that up to now I thought that our merchant marine, to which Congress has given millions and tens of millions and perhaps hundreds of millions of dollars to build up, had a right to carry our goods to all the world, just as other nations did, but at her own risk England, the mistress of the seas, carried out that policy and lost one hundred ships in the Spanish war. In the last war, Norway lost one thousand ships, at her own risk, and didn't come anywhere near going to war, and it was the same with Sweden with two hundred ships and Holland with another two hundred ships.

Stay Out of War

If I thought we could do it and make a little money—but I am convinced the public wants to go a little further, and I am with the public as one of their representatives. They want a cash and carry system and to keep our ships from going to belligerent nations, and if that is what the public wants, I am willing now to vote for it in Congress. If the Senate will pass the Vorys Amendment tomorrow, I will guarantee that within three days' time we could put through the Vorys Amendment with a cash and carry system and enact the bill into law within three or four days, because it is evident that the people now have concluded that they want to keep out of the war, and they think the cash and carry system will do it, and it evidently has a tendency.

If we want to sacrifice our own trade, that is all right. We can probably find places for our merchant marine down in South America. I hope you get it, I hope you get a German trade and South American and Mexican trade and all the rest of the world. I don't draw the line on Germany or England or any of the rest of that trade. I think we are going to get it. I think we will have hundreds of millions of dollars if this war continues. Mind you, I am not for this war continuing one day.

A reporter asked me about Hitler's statement for peace, and I said, "Well, we haven't anything to do about it in America. It is none of our business. It has to be answered by France and England, but I know what I would do if I had any chance, I would stop the war in a minute. I would have an armistice for thirty days and see if they couldn't come to terms, because nobody can win that war. Nobody can win; even the victor loses. All of Europe will come out ruined, bankrupt, and the civilization of Europe will be destroyed and obliterated."

So there is the situation we are confronted with in Congress: First, the Arms Embargo; I told you why I am opposed to it. Second, this cash and carry system; I am for it as long as it is cash and not credit and for strict neutrality.

Now we come to the real issue. Those are to me just byplays; they are just the amendments to the big issue. There is only one big issue before America today, and that is keeping America out of these foreign wars.

If we must go to war, we are going to war in defense of America, not in defense of the munition-makers, war profiteers, or of any foreign nation.

My answer to the whole thing is simply this: If these old nations of the world must arm to the teeth and go stark, raving mad, and go to war, it is their war and not our war, and I am ready to vote millions or billions—and down at Congress we get all mixed up with the difference between millions and billions—for adequate national defense, but not one single dollar to send an American soldier to foreign lands to fight other people's battles.

I read another Gallup poll this evening, and I believe they are right. I don't know that they are always right. I believe they are right on this, that 95 per cent of our people want to keep out of war. That a month ago was only 84 per cent, but today it is 95 per cent of our people.

The trouble with the situation is this: The internationalists in our own country, the interventionists, will stop at nothing to get us in, backed by millions and almost billions of money that will be spent for propaganda from foreign lands to get us in.

International Propaganda

So our country will be propagandized every day by these internationalists from within and foreigners from without, saying that it is our manifest duty to change our traditional American foreign policy and to go out and police and quarantine the world with American blood. That will become, day in and day out, the big issue in the country. If this war goes on, and I again repeat that I hope it stops immediately, and continues for six months or six years or ten years—and it may very well—all that time this propaganda is going to be unloosed upon us, the American people, trying to find some reason why we should go to war, why our men should be sent to the other side, to the battle, to try to help one side against the other.

All I can tell you is this, as a member of Congress and of the Foreign Affairs Committee—one of the few powers that has not been taken away from the Congress is the power to declare war, and that resolution must come from the Committee on Foreign Affairs—as far as I am concerned, I shall never vote to put the United States of America into any foreign war, unless our country is attacked by a foreign nation.

Let's Reaffirm Our Faith

Now as these Old World nations have gone to the left and to the right, into dictatorships of the left and the right, our free institutions are still the hope and aspiration of the struggling masses of mankind, whether they be in Italy or Germany or Russia or Japan. We professional and business men ought to reaffirm our faith. We have lost a little money in this depression. That doesn't mean that everything is wrong and rotten in America. We ought to reaffirm our faith and change from the defensive to the offensive, to uphold our industrial system, to protect it and safeguard it and our political system as well. We should reaffirm our faith in ourselves as free sovereign American citizens. We should reaffirm our faith in our republican form of government, which is the soundest, the fairest, the wisest, the most honorable, and the best form of government ever devised by the mind of man, in spite of what Communists and radicals say.

We should rededicate ourselves to that immortal saying of Abraham Lincoln that a "government of the people, by the people and for the people shall not perish from the earth."

These radicals and these Communists and these Fascists and these Nazis will tell you that the Constitution is a scrap of paper, that it represents reaction on Wall Street. Let me tell you, as one who has been in public life for twenty years, that the Constitution is the greatest charter of human liberty ever devised by man. It is what makes for our rights and liberties as a free and sovereign people. It is a barrier against the autocracies and dictatorships of the Old World. As Al Smith says, it is the civil bible of America that protects the rights and liberties of the minorities, racial and religious, and we don't propose to sacrifice any of our rights and liberties in free America.

So we serve notice upon all these Communists and Nazis and Fascists that if they don't like America and our free institutions and our ways of doing things, all they have to do is go back to their native land. If they continue to spread this poison and hate against our free institutions, against our industrial system, against you professional and business men in our American system, then it is the duty of the Congress of the United States to enact drastic deportation laws and deport these alien radicals back to their native lands, where they can enjoy the lack of freedom of speech, the pitiful wage scales and the oppressive laws they have been accustomed to in the past.

Conclusion

Therefore, in conclusion, let us reaffirm our faith in this American system of ours, in our industrial system, in our free institutions which are challenged all over the world tonight, and let us serve notice upon these Communists and Fascists and Nazis, and all other agitators, whether they are of the left or the right, that there is no room in free America for any of these foreign forms of autocracies, of dictatorships, that we believe in, that we have faith in our free institutions and our republican form of government, and in our representative and constitutional form of government, because we believe that we have the best government in the world today.

Machine Tools Create Employment

Second report of the A.S.T.E. Fact-finding Committee as given at the Semi-Annual Dinner, American Society of Tool Engineers, Cleveland, Ohio, October 6th, 1939.

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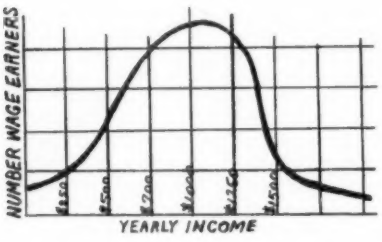
LET us repeat again from our Preliminary Report that there is a difference between the machine—the finished product, and the machine tool—the contributing cause. Without the machine tool the machine would not be possible, without the machine we would have no necessity for the machine tool. So, in effect, what affects the one affects the other. Let us, therefore study the machine first—the automobile, the iceless refrigerator, the radio, the electric washing machine, the tractor, and the many other things we have. They must be cheap otherwise we could not buy them. They must be within the range of our pocketbook. All useless, idle motions in their manufacture must be cut down if we are to realize the ideal of low cost. All steps that are taken in the manufacture must be with the desire to get low cost. If we can see our way clear to do a job with one operation where we formerly took several, we must take the step to realize our ideal.

This ideal is important because, as we shall see, there depends on it. mass production and mass employment.

The Income Curve

The shape of the income curve of the United States is most important in this research. It is as follows:



It will be noticed that the great majority of our people have incomes around $800 to $1200. If we want to have big markets, big consumption of our goods—"luxuries for the masses"—we must have our products brought within their reach.

Let us suppose a man has an income of $2000 a year and that he has 20% of this income available for savings or for the purchase of luxuries; in other words, he has $400 available for spending. With this sum he can afford to buy an $800 automobile, let's say, in two years, but what is significant with our assumption is that only a man with $2000 can afford to do this, and, also, only those who have incomes greater than $2000, so that we have available only the zone over $2000 as our prospective market for the $800 car.

Now supposing the $800 car is reduced by our research for low costs to $600, then we make the car available to those of incomes of $1500 per year. In other words we tap into an entirely new population between the abscissae $1500 and $2000, thus realizing an immensely increased market which in turn means greater employment to those who make the product. Only, therefore, by realizing this low cost can we hope to have increased markets and increased employment.

Cost of Distribution

There are two great factors which enter into this picture of costs. One is the cost of manufacturing, the other the cost of distribution. We might add the third factor, the cost of taxation. These two latter have been discussed briefly in our Preliminary Report. Suffice it to say that costs of distribution have not come down as costs of manufacturing have, and that costs of taxation are rising, so we are left in our desire to get lower costs with our emphasis on costs of manufacturing. Here we find the tremendous benefit the machine tool has been, and with it the new ideas and new systems that have contributed to the desired result. Only by the machine tool, only by its accompanying use of tools, dies, jigs and fixtures can we hope to offset distribution costs and taxation, and render the final product, the machine, available to the many. And yet we seek to place an additional tax on the machine tool which will delay this process of reducing costs still further, and bring about greater unemployment rather than lesser. The "goose that laid the golden egg" is going to be sacrificed because the machine is described as a labor saving device, whereas it is a labor creating device and a cost saving device.

Laws of Mass Production

Let us turn to further thoughts which may indeed be described as laws. If you make one of a thing then the cost of that one includes the cost of the land used, the buildings on that land, the equipment used, the tools, etc., the design and finally the labor and material. There are a few things of which we occasionally make one at a time. For example, we built one "Akron," the large dirigible air ship. We built one battleship at a time, once in a while we build one locomotive at a time, so perhaps, rather roughly speaking, we have all these costs entered against that one.

Now if we build 10,000 at a time, and there are many such things, then the cost of land, buildings, equipment, design, etc., are divided by 10,000 and we are left only with the cost of labor and material. Following this out to a mathematical conclusion, if we build infinity of a product then the costs of buildings, etc., are reduced to zero, and we are left with only the labor and material. And we do build about infinity of matches and cigarettes and rubber tires and so forth and so realize our ultimate ideal of purely the cost of labor and material. Labor and material do not remain unchanged however. Their costs come down also because with greater production we can buy materials more cheaply and we can save on the costs of labor by introducing new advanced machine tools and fixtures. Also material is composed almost entirely of labor. The iron in the ground or the milk in the cow's bag is of little value until labor and transportation are applied to process and transport it to properly placed usable material. Therefore, by mass production in the manufacturing processes we can get down to the ultimate of lowest possible cost being virtually that of labor. It is no wonder then that we are able to tap into vastly increased markets and so further reduce costs until we reach the ultimate.

We have many times marveled at the low cost of some of our simple products. Take the everyday glass bottle salt shaker which sells in the 10 cent stores. Consider the cost of making one only. You would have the costs of your glass furnace, your building, your glass blowing equipment and so forth just to get that one, and, further, the price of that one would be prohibitive and few would be sold, and so a very low ratio of employment would be reached. Today, with the little shaker in the reach of all, millions are sold and employment given to hundreds where formerly tens were employed.

Just to repeat and summarize. Lower costs bring about increased sales, increased sales bring about increased manufacture, increased manufacture brings about decreased costs and so on. The final result is that decreased costs bring about increased employment. And it is the machine tool which is responsible for these lowered costs. The machine tool definitely creates employment.

Higher Wages

Machine tools have definitely created higher wages and increased leisure. Let us consider the first subject. In the lifetime of your committee we have seen wages increased from some 20 cents an hour to today's wage of about one dollar an hour or even more. And the costs of living have not gone up in the same proportion, so that today's workman is able in many cases to buy for himself the products of his toil. There is no question but that an increased wage means increased ability to buy the comforts of life, so that the machine tool can be definitely said to have raised one's standards of living. There is, however, a danger point that we must be careful not to cross. There is an obligation that increased wages means harder work or more responsible work, on the part of those who get them. In such manner increased wages tend to produce lower costs. But there comes a time when increased wages bring about increased costs and so decreased manufacture, and decreased employment. The whole question is involved and is beyond the scope of this present report. Students interested should consult several of the authoritative books on the subject, notably that of Professor Paul Douglas. Suffice it to say that the use of machine tools has definitely increased wages beyond the cost of living.

Reduction of Hours

There is also no question but that machine tools have definitely contributed to reduced working hours or increased leisure. Let us quote from a British Parliamentary Commission investigating working hours some 100 years ago.

Question: At what time did your children go to work?

Answer: They went to work at three in the morning and worked until ten at night.

Question: Had you not great difficulty keeping your children to these hours?

Answer: Yes, many and many a time we had to shake them to get them up and many a time they have fallen asleep with their food in their mouths. They were extremely fatigued with their labor.

These were the days when an employer believed that the longer a man worked the more work he did, but the machine tool has changed this.

One of your committee members in his youth worked from 6:00 A. M. 'till 5:30 P. M. on Tuesdays and Thursdays. On Mondays and Wednesdays he worked from 6:00 A.M. 'til 9:00 P.M., and on Fridays he worked from 6:00 A. M. clear through 'till 12 noon on Saturday. Of course, there were intervals for meals, but even at that there was no time for leisure or recreation. No time for anything but work and sleep. The 16-hour day was a grim reality in the early days but soon we came down to a 12-hour day, 60-hour week, and conditions were slightly better. Today the 8-hour day, 5-day week is practically universal and we are actually faced with a 6-hour day, 5-day week—30 hours of work as compared with the 96 hours per week we used to have.

We mentioned that in the old days an employer felt the longer a man worked the more he did. This has been disproved and now we find that up to a certain point the less a man works the more he does. The 44-hour week gives greater efficiency per hour and greater efficiency per week than did the 10, 12, or 16-hour day. In fact we reach the surprising fact that actually men were displaced by the change over to shorter hours, but the question arises are we reaching a limit. And the answer is that we are. The six-hour day definitely gives more efficiency per hour but less efficiency per week, so that somewhere around seven or eight hours is our most efficient work period, the point where we get best returns, the point where we get lowest costs. The forty-hour week is therefore the most ideal period for men to work and the machine tool has contributed to this ideal in great measure.

Now the above facts have a great bearing on our social life. Many people think that man has become a slave to the machine tool, but this is not so. He is only in contact with it eight hours a day and the remaining sixteen hours he is his own master to participate in recreation and in sleep as he wishes. A survey was once made of the leisure time activities of the machine operatives of a large mass production shop. For eight hours a day they controlled the machine in the plant, but after work they engaged in all kinds of pursuits. Some were gardeners; some were musicians; some were photographers, and so on it went, each individual master of his own work in the majority of his time. This recreation the machine tool has made possible. The machine tool of today requires very little skill to operate it, but this does not mean that the operator is "dumb." The operator can transfer his skill to his recreational pursuit.

Machine Not a Cure-All

The Machine as continually developed has done all of this, but the enormous burdens placed upon industry during recent years is beyond the ability of the machine to carry, and we find that each year we are depleting our capital structure. We are using up part of the structure upon which jobs depend because the burden has been added faster than the machine could be developed to offset it.

From the statistical abstract of the U. S. Department of Commerce, we learn that there were 415,205 corporations in the United States during a recent statistical year. Of the total, 54% or 227,545 corporations possessed assets of less than $50,000 and 312,882 corporations over 75% reported no net income on their corporation tax returns that same year. Their accounting costs have been increased substantially by reason of having to keep a multitude of additional records and make reports on income tax, capital stock tax, excess profits tax, sales tax, unemployment tax, Social Security tax, real property tax, intangible property tax, personal property tax, tax on dividends, surplus tax, corporations privilege tax and others in addition to seniority records, salary and wage records and many others. Many corporations estimate the increase in cost of accounting over 50% and the actual tax cannot be arrived at accurately.

The National Tax Commission, Inc., Chicago, Ill., reports "206 different taxes in an automobile not counting the consumers sales tax. And this is not all by far because 15,000 parts and many more pieces in a car make impossible the computing of the cumulative tax totals accruing from each item."

Recently into the burden picture appears the National Labor Relations Board and a recent survey made by the editors of "Mill & Factory" show an average cost of $20,572.00 per company to defend themselves against charges of the board. Marvey W. Barclay, editor of "Mill and Factory" finds that over 75% of our corporations are financially incapable of defending themselves against N.L.R.B. charges regardless of the fairness or accuracy of the charge and can only agree to comply promptly with any ruling or order of the N.L.R.B., no matter how completely distorted and unfair that order, decree, finding or decision may be. He also finds that of 638 charges filed against 76 companies included in their survey, 319 or 50% of these charges were dismissed, this indicating the accuracy of their finding.

Also during recent years we find our law-enforcing bodies permitting strangers (not employees of the concerns involved) parading under C.I.O. banners, to walk in and take plants away from the management and hold them until recognition of something or other was granted. The sabotage and destruction incident to such situation are additions to the burden.

As a result since the year 1929 we have reduced or depleted our total capital structure over 61 billions of dollars and if the estimate of $6,500.00 capital investment per job is accepted then over 9,380,000 jobs have been destroyed since 1929. A survey of any industrial city will reveal many plants abandoned, dismantled and partly or completely torn down and there is evidence in abundance of businesses discontinued, men withdrawing from industrial activity because of their inability to conserve their assets under present conditions. A large part of our national industrial structure is made up of small businesses and these gradually fade without clamor. Our large industrial giants cannot liquidate so easily.

The Machine by its development can and has increased wages, provided increased employment, and has raised our standard of living but cannot overcome the enormous burdens placed on it in recent years.

Coal Mining

Now let us return to the laws of mass production. There are exceptions to these laws and they are met with in the coal mining industries. Coal was and still is one of the vital factors in industrial processes. But within recent years there have come about equally efficient substitutes. Gas has come in strongly as a competitor. We have our gas range and our gas furnaces domestic and industrial, and gas as a fuel is in strong demand. Likewise with oil, the domestic oil furnace people have waged a successful campaign to bring about the use of oil as an equally economical fuel and coal has rapidly been displaced in many sections of the country.

Then there has been the tremendous rise in the efficiency of boilers. So many pounds of steam per pound of coal has been demanded and until today we have reached in our large boiler plants practically the ultimate in economy. All of which means a lessening in the demand for coal.

Mechanization—the use of tools in the mine has distinctly reduced costs, but these lowered costs were almost entirely absorbed by the workers in higher wages, and working conditions. They were not partly passed on to the consumer and because of that were not sufficient to effect the other economies mentioned above and so the demand for coal did not respond. In this case employment lessened, not alone to mechanization but to other causes outside the scope of the coal miners. This case is one of the very few where mechanization is partially responsible for unemployment. At least we think so for there are few figures which tell the whole story.

Cigar Manufacture

Let us now turn to another industry where mechanization has played an important part. It is that of the cigar making industry and the Bureau of Labor has made an intensive study embodied in its Bulletin No. 660, from which we quote.

Ingenious power driven machines semi-automatically perform the cigar making operation itself. These machines have led to a reduction in the amount of labor required of about 52 per cent as compared to the labor of the hand made process. In terms of production costs this figure represents a difference in favor of the mechanized process of at least $3.00 per 1000 cigars on the basis of wage rates previously in 1936. This fact in turn has brought about a reduction in the size of the labor force required by the industry. The industry employed 112,000 wage earners in 1921. In 1935 this number was reduced by half, to a total of 56,000 workers.

Another disturbing factor is that hand cigar makers have generally not been employed as cigar machine operators; these latter have been recruited generally and directly from the ranks of unskilled labor. It is estimated that by 1935 about 44,000 such hand workers had been severed from the industry and new jobs had been provided for about 17,000 new workers from the unskilled class brought in to run the new machines.

At first sight this would seem to be an indictment of the machine but the above figures do not tell the whole story. During this period 1920 and 1936 there has been a reduction in the total volume of production of cigars amounting to more than 36 per cent. In other words, production of cigars did not respond to the stimulus of lower prices. Some one some time ago said that what the country needed was a good 5-cent cigar. Well, we have it, but we are not smoking it. If cigar smokers had responded to the effect of the lower prices, there would have been more cigars smoked and therefore, although there might have been a shift in the type of worker, there would have been a net effect of more workers employed. Instead, however, the public changed its smoking habits and went for the cigarette, which in its turn has shown a phenomenal increase in production. We have few figures, practically none are available, but it is quite possible that the greater use of cigarettes, ranging from practically zero use in 1900 to 150 million pounds in 1920 and then to 450 million pounds in 1935, has taken up a good deal of our labor.

Stating this in other words, if cigar makers had been flexible in their skill they could have switched from cigar making to cigarette making. Or in still further words, for we again do not know the entire story, it seems likely that the total employment irrespective of types in the cigar making, cigarette making and pipe smoking tobaccos has changed little since 1920, and may, if anything, have increased.

However, returning to the cigar makers, this does not help their case at all. It is largely not an indictment of the machine but rather of the change in tastes of the buying public.

No Figures Available

Let us digress for a short time. We have mentioned at times we have no figures. We have practically none. We have approached the various statistical authorities, including the Bureau of Labor, for authoritative figures but the results are surprisingly meager. Mr. Isadore Lubin, Commissioner of Statistics of the U. S. Bureau of Labor, states "You are right in assuming there is very little literature and still less definite information on the problem of technological displacement of labor and technological employment."

He adds, "labor displacement resulting from improved technology should be tantamount to technological unemployment. But industry does not operate in a vacuum. Changes in technology are generally accompanied by or are the result of other changes, not only in the industry in which the technological development takes place but also in many related and unrelated industries. Because of the maze of factors which operate simultaneously impacting upon each other and upon technology, the net effect of a technological improvement may be both an increase in employment as well as a decrease in employment."

"It is of course impossible to tell at any one time how much technological unemployment exists in the country, especially since we have not yet developed an effective method of measuring total unemployment."

There are many thoughts which arise from a study of these points made by Mr. Lubin. The first thought is "have we raised a Frankenstein of unemployment to bewilder us when we have no facts or few facts to go upon." Are we copying the issues raised by the depression years since 1929 and stating that technological advance is responsible for all our troubles. Are we blaming the machine tool for matters entirely outside its sphere. It certainly looks like it.

Maze of Factors

Mr. Lubin mentions the "maze of factors." There certainly have been many, all contributory to cost saving if not perhaps labor saving. Let us mention one at the moment; namely, the great increase in the Time and Motion Study movement, summed up in what might be called the wage incentive idea. In the early days the time-study man was purely a recorder of times and was expected to do little else. Today he is looked upon as a means of getting the men to do better work in faster time with the use of existing facilities, and a wage incentive is offered to make the men work harder. This factor may or may not have contributed to unemployment. It is not our province to discuss it in this report, but it certainly has had an effect in which the machine tool has played no part.

Or take our countless systems of plant control, inventory control, planning methods, material control, and what not, and try to determine just what part they have played in affecting the employment of men, and yet the machine tool has had little part in this work. The whole situation is involved.

Machine Tool the Goat

It is difficult to comprehend but the fact emerges that many changes have been made since 1919 and the machine tool has only been a part of the whole. In shop language the machine tool "has been made the goat" and we are in danger of taxing it still further to seemingly help us out of our economic difficulties.

There is one very significant fact that does stand out very clearly at the present. If the machine tool were in control of the situation then our machine tools would be working and men would be idle. In other words, machine tools would be doing the work of the people and men would have been displaced. So again let us look at the facts.

In 1929, 1% of our men were unemployed and there was no idle machinery. In 1933, at the depth of the depression, 25% of men were unemployed and there was 22% idleness among machines. In 1938, 20% of men were unemployed but 27% machines

were unemployed also.

These facts are taken from a survey made by the National Industrial Conference Board. Bulletin No. XIII, No. 4. It states: "Machine tools which do the greater part of the work performed in modern industry stand idle about one-fourth of the time they were in use in 1929." The answer is clear.

Put Machine Tools Back to Work

Put the machine tools back to work and the slack of unemployment will be taken up. This can be done only by rebuilding our capital structure, since over $6,500.00 capital investment is required for each job. When business can be allowed to operate with a reasonable degree of assurance that it can safeguard its capital, can be unburdened of the terrific detail and tax load occasioned by the many overlapping taxes reports and records required by government today, can hire an employee without mortgaging the future to assure employee relations, and can fire the incapable or non-cooperative workman without committing an unpardonable crime, then you and I can invest our savings in business again. Hundreds of thousands of small businesses and industries can spring up and grow as they have in the past and their growth, continually adding workmen will build our capital structure and solve our unemployment problem. It is in a sense not our idle machines which cause unemployment. It is not our working machines, for they create employment. The answer to the unemployment question lies far beyond the machine tool. The problem of the depression lies in a study of economic data, a study we will attempt to make in our third report. Taxation, war scares, trades union problem, political set-ups and so forth are problems beyond this second report. They are problems which should be studied very seriously and yet very delicately, for again, there are few men who know the answer. Again, there are few figures and we repeat for emphasis, it is unfair to make the machine tool the burden bearer for all our evils.

Labor Displacement

Let us, therefore, return to a portion of the first report which we wish to amplify for emphasis. The part relating to the fact that machine tools do sometimes cause temporary, even at times permanent displacement. We have seen in the case of the automotive industry that the displacement is temporary, that new jobs come along and await the man who has been displaced for a short time. The painter of horse buggies becomes the painter of automobiles; the man displaced by the newer milling machine can take his place on the conveyor line.

But what about the man who is really displaced. What about our man making cigars by hand. He has wonderful skill, but his skill is directed to one end. He sees the progress of mechanization. He sees his job being taken away from him, but he hangs on to the one trade he knows, hoping against hope that this progress will be delayed, until finally the orders come and the machine takes his place.

There are very few industries in which this takes place, but they have been significant in that the voice of the minority speaking has led to the claim that machine tools do displace labor. In fact we as a nation of people have developed the habit of believing the exaggerated cries of minority groups. One barefoot child in a large family is sufficient exhibit to entice full living expenses for the entire family for long periods of time. A misunderstanding of the misfortune of one workman is sufficient exhibit to disrupt an entire industry; one diseased or injured employee, even if the result of his own negligence, can bring discredit upon an entire organization and one good impulse exhibited by a hardened and habitual criminal can ofttimes effect his freedom. The important fact is what are we going to do with the man. Usually he is too old to make a change. If young enough, he should see the change coming and seek to change his skill to accommodate it to the new order. If too old, however, there is one hard fact that emerges and that is that so far we have done nothing about it.

The statement of President William Green of the A. F. of L. quoted in our first report should be considered very seriously. When we realize we are planning to make changes which will displace labor temporarily or otherwise, we should then take steps to see what we can do with this displaced labor. Labor as a rule is inflexible but by education and training it can be made more flexible and the young man at least can be aided in seeking the new niche in which he can fit. Progress must go on. We should endeavor by all means in our power to see that the result of this progress is cheaper goods; so that the machine—the automobile, the radio, the washing machine, etc.—can be made available to the greatest number of people. We cannot have more by producing less. If the total wealth produced per year is greater the pro rata share of income must be greater, conversely if the total wealth per year is less then we must each expect to get less as our pro rata share. A portion of the population is ill equipped to produce or earn their share of the wealth produced and we sorely need a champion to represent that group. Midst all of the confusion, strikes, propaganda, coercion, fighting, etc., which interfere with wealth production now, it should be noted that no labor leader, government official or private group has defended the rights of the man or woman who has a job, is satisfied with it, wants to work, needs to work and has a legal and moral right to work. Labor leaders shout and battle for what they call labor's rights while at the same time they illegally interfere with the rights of a vast number of workers who do not need nor want their interference.

An analysis of the results of many strike settlements shows that generally the only change in the status of the workman is that he finds himself saddled with the responsibility of contributing $1.00 or more per month for the privilege of working and at the same time his income is reduced and his working conditions less congenial.

Capital Structure is to Labor as the bow string is to the bow; each useless without the other. Why then should not the measure of efficiency of labor leaders be how much they can improve the success and development of the industry of which their followers are a part rather than their present conception of how much they can injure, harass and finally force their industry into uneconomical operation and tear down capital structure. If labor had a sound, necessary platform, wouldn't workers willingly flock to its banner of leadership? Why should it be necessary for them to intimidate, threat, insult and beat up workers to force them to join, if they have a sound workable program to benefit the worker? If it is sound and right it will grow and prosper and if it isn't it will fail regardless of the force used to jam it down the workers' throats.

Another fundamental rule we have overlooked is that in the spring we must plant and in the fall we must harvest and stow away the necessities to sustain us through the unproductive months of winter. Very few industries can operate without seasonable increase and decrease of volume. Seasonable layoffs are inevitable, so why shouldn't we conserve a portion of our income during the harvest time to support us during the layoff period. Too many people spend their income as fast as received and expect government help the next week following a layoff.

Remove the excessive burdens from business, force cooperation between capital and labor, invite and promote the use of additional capital and build up our capital structure, encourage the further development of the machine thereby making it possible for us to produce more and produce it easier; and by all means let us each take on more responsibility for our own well being.

Only by such means can civilization grow. Only by such means can we reach a high standard of living.

Exhibits

From Machinery and Allied Products Institute:

The light of a tallow candle flickered in the cold darkness of the back room of a clothier's shop. Eager eyes and tense hands were occupied with the construction of a machine—a new machine such as had never before taken form in the Western Hemisphere.

It was a winter night in 1790 at Pawtucket, Rhode Island, Samuel Slater, a young English-born mechanic who was to go down in history as the Father of American Manufacturing, was laboring over the first Arkwright type of cotton spinning machine to be built in America.

He began work in January, 1790, and

worked day and night until December 20, when the mill was ready for operation.

Within a few weeks, after the success of Slater's invention had been proved, his employer wrote to President Washington and told him that America would soon be able to manufacture all the cotton cloth needed in the nation. Alexander Hamilton, the first Secretary of the Treasury of the United States, later acclaimed Slater the "Father of American Manufacturers." Slater died in 1835.

The first factory equipped with Slater's machinery employed fourteen workers. At the time of the last census there were more than 14 million on the payrolls of the nation's manufacturing and mechanical industries. This country is a product of the Machine Age. Even its rapid population growth is largely a result of the role played by the machine.

Since 1870 America has developed the manufacture of a vast number of new products. This has led to the founding of many of the world's largest industries. Some of these industries have grown out of inventions first patented in England, France, Germany and other countries, and many of the new industries developed by American talent and work have been copied by other nations. But no country in the world has led in the development of as many new industries as America.

Following is a list of 15 important manufacturing industries developed since 1870, with their direct employment in 1937, to say nothing of the incalculable indirect employment they create:

Automobiles and parts	513,800
Electrical machinery and supplies	333,700
Rayon products	153,000
Gasoline and oils	100,500
Rubber tires and inner tubes	75,600
Radios and phonographs	58,700
Refrigerators and refrigerating	50,600
Tin cans and tin ware	39,000
Aircraft and parts	32,100
Ice cream	32,100
Cash registers and computing machines	31,000
Aluminum products	30,300
Typewriters and material	26,900
Electric lighting equipment	26,600
Electric railroad cars	25,200
	1,529,100

One of the most significant steps in making the general use of machines practical was the development of interchangeable parts. America made such progress in advancing this principle that in Europe it is known as the American system.

Think how difficult automobile driving would be today if tires, spark plugs and fan belts were not standardized but had to be made especially to fit individual cars—not makes, but individual cars. When a flat tire could not be patched, the wheel would have to be sent to the factory to have a new tire made to fit it. Modern automobile manufacture would be impossible if different factory units could not make different parts, all of which are known to fit.

The machine has built American civilization. But it has not done it without struggle by those who knew its value against those who feared its advance because they did not understand it.

Output per worker in English textile mills soon outstripped the rate which originally brought on riots and predictions of doom, yet England has become one of the most prosperous nations in the world largely as a result of textile manufacturing, and a larger percentage of the world's population is receiving its livelihood from employment in the spinning and weaving of cloth in the twentieth century than ever before in history.

There are many brakes on the wheels of progress. Technological advance has always been opposed by some who contended that a decline in employment opportunities followed in the wake of the machine. The advance of science and technology is always changing occupations, but more jobs are created by it than become obsolete.

Between 1920 and 1930, the last two census years, nineteen principal occupations showed a decline of 807,000 jobs. During the same period nineteen principal growing occupations added almost three new workers for each one the nineteen vanishing ones lost. Most of the losses in employment were due to advantageous social changes, and they do not mean that there were 807,000 fewer jobs in 1930 than in 1920. In fact the census shows that gainful employment increased about 7,000,000, from 41.8 million to 48.8 million. Technological advance created far more jobs than were lost in these occupations. Following are principal occupations which declined:

Some Vanishing Occupations:

Apprentices in building and hand trades	34,000
Blacksmiths	74,000
Draymen and teamsters	309,000
Dressmakers (in home)	75,000
Glass blowers	6,000
Stable hands	12,319

Many of the expanding occupations are old ones which grew as the standard of living rose and increased demand. But new industries like air conditioning, television and the manufacture of plastic products are constantly creating new occupations which add employment opportunities to those already existing. For instance, rayon manufacturing did not appear in the 1920 census reports because the census takers did not recognize it as an industry. In 1930 more than 20,000 workers were classified as "Operatives" alone in rayon factories.

Following are some growing occupations in which more than two million new jobs were created between 1920 and 1930:

Automobile factories	40,793
Barbers, hairdressers and manicurists	158,097
Chemical and allied industries	47,051
Electrical engineers	30,760
Engineers (stationary), cranemen, etc.	36,980
Garage workers	35,243
Managers and officials (manufacturing)	62,806
Mechanics	356,512
Plumbers and steam fitters	31,096
Truck drivers and chauffeurs	687,000
Upholsterers	22,847

In 1870 about 32 out of every 100 persons in the United States were gainfully employed, according to the United States census. In 1930, according to the last census, about 40 out of every 100 were gainfully employed. Back in 1830 only 27 out of every 100 persons in the United States were gainfully employed. Thus there was an increase in 100 years of almost 50 per cent in the proportion of the population gainfully employed. Even in the years of most severe depression in the 1930's the percentage was higher than in periods considered prosperous prior to 1900.

The significant fact here is that the highly developed technological society in America has provided more jobs even in proportion to population than were provided by a simpler handicraft society.

Few occupations have been affected more by mechanization than those in the manufacturing and mechanical industries. Yet between 1870 and 1930 employment in these industries increased 414 per cent while population increased 218 per cent. In the period of rapid technological advance since the beginning of the century, a similar increase has taken place. Between 1899 and 1937, while population grew 72 per cent factory employment grew 77 per cent. A greater proportion found livelihood from factory employment in 1937 than before this period of great technological development.

The factory jobs created as a result of industrial mechanization are but a fraction of the total number of jobs developed throughout the country by technological advance. As the kinds and volume of manufactured goods increased, jobs were created and increased in a vast number of distributive, service and allied occupations by the movement of raw materials and finished products of these new and larger industries through the channels of trade, and by the countless demands for services which the increased economic activity generated. The jobs thus created are very large in number and are the direct and indirect result of technological advance.

Further than this, numerous service occupations have been developed around the use of new technological devices. Hundreds of thousands of jobs in office work, for instance, have been created by the development of the typewriter and other office machines.

When we examine specific industries we find that employment has grown fastest where technological advance has been greatest. The increase in employment has resulted principally from an increase in volume of output.

Great strides in technological progress were made with the introduction of the continuous cold process of strip rolling which was introduced in 1926. This process, along with other technological developments, made it possible to produce a vastly greater number of types of finished steel products. As a result there was an increase in employment per ton of finished product. By 1937 the steel industry was employing

(Continued on page 40)

Inter-changeability

—By C. E. CODD*
MEMBER A.S.T.E.

WE are living in a wonderful age. When we look around us and think of the automobile, airplanes, radios, washing machines, air conditioning units, and the many other products of mass manufacture (all of which are interchangeable in their component parts), we realize that life has been made more enjoyable, has taken away most of the drudgery in the home, and allowed even the poorest of us to see more of the world in one year than the people of medieval times saw in a lifetime. We all are apt to pat ourselves on the back and say, "See what improvements we have made in the last 20 or 30 years," without taking into consideration the amount of preliminary work it was necessary for our predecessors to do to make this possible.

To produce all of these wonders one thing was necessary, which we may not think of, or, if we do think of it, we pass it off as if it had existed always; and that is a System of Measuring or Standards of Length. Where did this system of measurement originate?

With the progress of civilization came the need of uniformity in the common units used. In time there came also the need of subdivision, extension and coordination of the fundamental units and the result was the development of the System of Weights and Measures. The earliest definite System of Weights and Measures of which we have knowledge were those of the ancient eastern kingdoms, such as Egypt, Babylonia, China, Rome and Greece, and authorities declare that with the exception of the Metric System, of comparatively recent origin, all other systems have descended from them. The Metric System may be broadly distinguished from these other systems by the fact that it is modern, non-racial, impersonal and somewhat artificial in nature, being related only to the length of a certain selected terrestrial meridian, while the other systems are of ancient development, ethnic or popular in character and natural in origin, being generally derived from lengths of different portions of the human body.

Origin of Measuring Units

Quoting from Mr. W. A. Viall's paper read before the Providence Association of Mechanical Engineers, "The 'foot' it is thought first appeared in Greece and the standard was traditionally said to have been received from the foot of Hercules, and a later tradition has it that Charlemagne established the measurement of his own foot as the standard for his country." In England, prior to the conquest, the yard measured, according to later investigations, 39.6 inches but was reduced by Henry I in the year of 1101 to compare with the measurement of his own arm. The term "So many hands high" is still in use to designate the height of a horse. The length of the first joint of the finger represents one inch, the length of the foot, one foot, and the length of the arm one yard.

The present system of measurement common in Great Britain and the Colonies, also in the United States, has come down to us from the Anglo-Saxons; in fact, the Anglo-Saxons' measurement of length down to the present time has remained on the same basis as was given in the Statute of Edward II in the year 1324, where there is a statement in statutory form of what has since become the well known rule that three barley corns round and dry make one inch, twelve inches one foot, three feet one yard, five and one half yards one rod, pole or perch, and forty rods in length and four rods in breadth make one acre.

The Weights and Measurements in use in the United States at the time of the American Revolution were all of English origin and were in use in England at that period. More or less authentic copies of English Standards have been brought over from time to time and adopted by the different Colonies. Divergencies in these Weights and Measures were, however, quite common, due, no doubt, to the fact that the system of measures of England was not itself well established and hence the copies brought to the United States were often adjusted to different standards. This led George Washington in his first annual message to Congress in January, 1790, to urge uniformity in the currency, weights and measures of the United States. This was referred to a Committee of the House of Representatives. No action was taken for a number of years. This was again brought to the attention of Congress in 1819. After many conferences, action was again deferred. While Congress had been considering this matter, most of the states had, independent of one another, secured and adopted standards. Most of these standards they adopted were brought from England. Nevertheless, standards of the same denomination differed widely among themselves, thus perpetuating confusion in the commerce between the adjacent states. In 1830 the Senate passed a resolution directing the Secretary of the Treasury to investigate these conditions. As was anticipated, large discrepancies were found to exist, the average comparing very favorably with the measures in use in Great Britain at the time of the American Revolution. Without waiting for authority from Congress, the Treasury Department went ahead and adopted the 36 inch yard. The standard yard adopted was 36 inches, comprised between the 27th and 63rd inches of a certain 82 inch brass bar, brought from London in 1813, and the 36 inch space referred to was supposed to be identical with the English Standard at 62 degrees Fahrenheit.

The Bronze Yard

Congress in 1836-38 directed the Secretary of the Treasury to furnish these measurements to the states. In October, 1834, the British Imperial Yard was destroyed by fire. When the new standards were completed, two copies of the yard were presented to the United States, arriving in this country in 1856. One of these bars, namely Bronze Yard No. 11, was accepted by the Office of Weights and Measures as the standard of the United States. Bronze No. 11 is 22 millionths of one inch shorter than the Imperial Yard at 62 degrees Fahrenheit.

The expansion of Bronze No. 11 is 342 millionths of an inch for each degree Fahrenheit, so you can see the reason for a given temperature in any department which has to check close measurements.

With the adoption of the No. 11 Bronze by the United States as the standard yard, and which was made compulsory throughout all the states, the manufacturers of machinery, guns, ammunition, scales, tape measures, etc., were given something definite to compare their products with, but even then it was more or less of a cut and try proposition, assemblers of machinery being required to fit parts together, each assembler having a bench lathe so that he could fit by filing any round male part to its mating member. The same was true of any irregular shape. As far as we are able to find out, interchangeability came into being during the Civil War of 1861-65 and was used in manufacturing rifles and guns; in fact, I, at one time in my career, worked with Messrs. Chamberlain and Bixby, old designers and toolmakers, who had worked in the Springfield Armory all through the Civil War and they claimed inter-changeability in manufacture started there. To get these results, four sets of gages were made for each individual part as follows: working gage, inspector's gage, master gage, and gage to check master gage.

Even then, there was nothing definite as regards size being absolutely standard but they could at least duplicate parts so they would be interchangeable.

When machinery first came into com-

* Master Mechanic, the Ritter Dental Manufacturing Company, Inc., Rochester, New York.

mon use, it was found necessary not only to use the method of binuary subdivision or repeatedly splitting in halves such as ⅛, 1/16, etc. but to decimate the one inch to one thousandth of an inch. The one thousandth is again decimated to ten thousandths, hundred thousandths and even to one millionths, which is being done successfully by Johansson (now the Ford Company) and Pratt & Whitney Company, temperature, of course, being one of the essentials necessary to arrive at these close measurements, 68 degrees being standardized by Johansson as the temperature to be used in connection with standard blocks, which were patented in June, 1901, and is now the recognized standard of the world.

Systems and Tools of Fine Measurement

The Vernier System of Measurement was invented by a Frenchman—Pierre Vernier, in 1831. The first Vernier caliper was invented in 1851 by Joseph R. Brown of Brown & Sharpe. The micrometer originated in France in 1841 and was known as the Systeme Palmer, being patented in France in the same year. Mr. J. R. Brown and Lucian Sharpe saw the tool during their visit to the Paris Exposition in 1867. Upon their return they built and introduced the Sheet Metal Gauge, which has developed into the micrometer of the present day.

I have covered this subject in a more or less desultory manner but have given you enough high points so that you can see that it would be utterly impossible to produce inter-changeability in the multiplicity of products which America is manufacturing at the present time, unless this preliminary work had been done by our predecessors and made compulsory in the United States.

From its inception our company saw the need of inter-changeability on the Ritter chair, and the absolute necessity of inter-changeability on the bearings and shafts of our dental engine, laboratory lathe, and all other products of our manufacture. To produce the new type of equipment it was necessary to have the latest machinery, tools and gages in our plant. It was one of my first tasks in the year 1901 to replace working gages for measuring taper end on lathe shafts for the correct fitting of standard chucks; also working and master gages for the old type cable engine armature shaft. The system followed was the same as used by the Burgess Gun Company, Buffalo, where I was formerly employed in the year 1893, which they copied from the Springfield Armory Gun Works.

There was some abbreviation in the number of gages used as the micrometer had come into use at that time and sizes could be more or less maintained (although there are no two pairs of micrometers which will read exactly alike in the same position), so the system used was master gage, working gage and inspection gage, with the exception of work with greater tolerance where only the master gage and working gage were used. This system has been carried through in its entirety on all of our products; in fact, parts of the engine, lathe, and other equipment, where the same sizes have been retained are absolutely inter-changeable with the product of the present date. All of these gages are inspected periodically and when worn, are replaced. In case of the one ten thousandth limit, gages are checked each time they are used. The life of such gages can be prolonged to a considerable extent by chrome plating, which we take advantage of.

As you would note in a trip through our plant, gages are in general use. On gages where extreme accuracy is required, we have checked up the standard sizes after making the master gages by submitting master gages to the Brown & Sharpe or Pratt & Whitney companies and, in a number of cases, we have bought a full set of master gages which are guaranteed to within five one hundred thousandths of an inch. In the case of the ⅞" for the lathe bearing brackets, the master gage is checked within two millionths of an inch. (The coefficient of expansion of the different materials used for shafts and bearing bushings is quite a factor in holding the correct relative clearance between bearing bushing and shaft.) We had some trouble with the old Lumen bearings on the lathe, due to the high coefficiency of expansion of this material, especially in humid or saline atmosphere, but this was overcome by the latest type of bearing material known as leaded bronze.

America—Pioneers of Interchangeability

The American nation has been a pioneer in interchangeable production, and our company has kept to the forefront in this respect, having not only kept our products consistent in quality but if any improvement is made in the mechanical world, in machinery or equipment, we are always anxious to supply new machinery or tools to the factory organization. Notably, we were the first people in the Rochester district to use high speed steel, the very first to mold bakelite, the first to use tungsten carbide and one of the first to buy Johansson gages. This was followed by the purchase of two sets of Hoke Blocks of the same precision but manufactured by the Pratt & Whitney Company.

Regarding measuring machines, we purchased Prof. Sweet's of Syracuse in 1905, Pratt & Whitney's in 1920 and an improved type which was purchased in 1936 at a cost of $455.00.

During the years 1936 and 1937, we scrapped or sold 59 old machines of different types and purchased new machines to replace them, which extended in round figures to approximately $125,000, and, by the way, the small allowances made for the old machinery were considered velvet as they all had served their purpose well.

Good Tools—Good Work

I want to mention the jig borer in our glass enclosed room, which is of the very latest type construction and is guaranteed to an accuracy of less than one tenth of a thousandth. The instruments supplied with this new machine will register to five one hundred thousandths. All of our dies, jigs, fixtures and molds are laid out on this machine so interchangeability is certain.

To give you an idea how close this measurement is, the hair from a person's head measures approximately from 1½ to 2½ thousandths of an inch in diameter or, from 15 to 25 times coarser than the measurement which can be maintained on this machine. Previous to this machine we had a Pratt & Whitney jig borer which did not have the refinements which we have on this latest type machine, but was the best that could be purchased at that time. (Continued on Page 50)

American Society of Tool Engineers

(Incorporated)

DETROIT, MICH.

PHOTO

Photograph Not Necessary

APPLICATION FOR MEMBERSHIP

TO THE MEMBERSHIP COMMITTEE: Date .....

I hereby apply for membership in the American Society of Tool Engineers, Inc., in the grade of membership to which in your judgment I am entitled.

Type or Print Name .....

Name and address of company .....

Title, position or occupation..... Name of Superior Officer .....

Products or business of company .....

Address for Society mail.....

General Statement of Qualifications

Date of birth—Year ..... Month..... Day .....

Place of birth—City ..... County..... State .....

Of what country is applicant now a citizen? ..... Race .....

Naturalized? ..... When?..... Where?.....

Grade School ..... Address .....

High School ..... Address .....

Technical School ..... Address .....

Outline of technical education .....

.....

.....

Names of other scientific, engineering, architectural or civic organizations of which you are a member:.....

.....

.....

List of References

Give five members references, seven if feasible. If an applicant does not know a sufficient number of members, he may give as references the names of non-members who are familiar with his work. Give address of non-member references.

1 .....

2 .....

3 .....

4 .....

5 .....

6 .....

7 .....

OVER

Record of Qualifying Experience. (In space below supply complete record of past and present connections. Describe duties of present position fully so that membership committee will understand the nature of your work. Write proper names, names of companies, etc., legibly and without abbreviations. If space is not sufficient, continue the record on separate sheets of this size.)

FROM	TO	YEARS	NAME AND ADDRESS OF COMPANIES	TITLE OR POSITION	SPECIFIC DETAILS AS TO NATURE OF WORK

FILL IN—TEAR OUT AND RETURN

Specialty: if any .....

I hereby certify that all statements made in this application are correct, and agree that if elected, I will be governed by the Constitution and By-Laws, as long as my connection with the Society shall continue. I furthermore agree to promote the object of the Society so far as shall be within my power.

Applicant's signature .....
(Must be in ink)

Initiation Fee Must Accompany This Application

Office Record

Received ..... Acknowledged ..... Investigated ..... Elected .....

Grade ..... Signed .....
Chapter Membership Committee

Remarks: .....

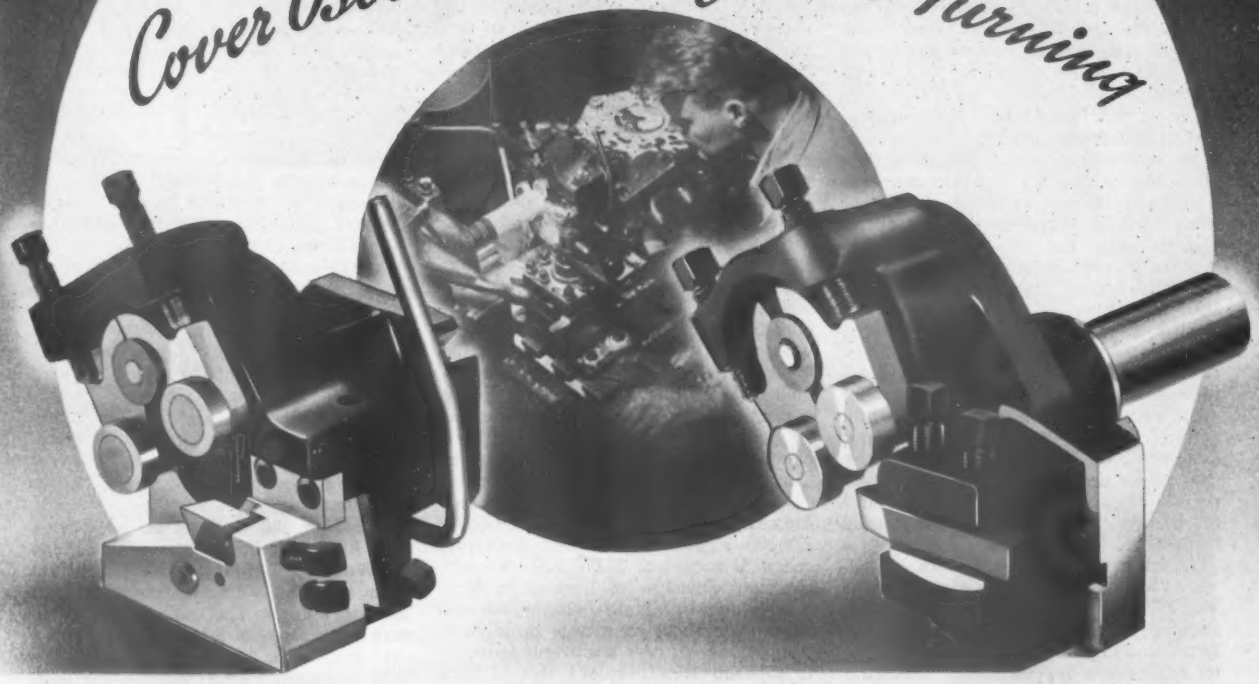
.....

.....

Signed .....
National Membership Committee Chairman

These Two New CUTTER TURNERS

Cover Both Fields of Bar Turning



This new Warner & Swasey Single Cutter Turner is a high-production tool designed to handle the maximum feeds and speeds of modern turret lathes–ideal for high-speed steel or carbide cutters.

This tool is equipped with anti-friction bearing rollers—adjustable cutter block—relief for the cutter block—and flanged mounting to assure utmost rigidity.

The last word in a single cutter turner. You can get full details on this tool on page 72 of the new Warner & Swasey Tool Catalog.

• There are distinctly two separate fields of work for bar turners—one demands the utmost in accuracy at high speeds with heavy feeds, using high-speed steel or cemented carbide cutters—the other demand is for secondary work on new machines or for use on old turret lathes where maximum power and speed are not required. Here are the turners that meet both these demands.

This new Combination End Facer and Turner is a turning tool for secondary operations or for use on old machines where the maximum in power and speed is not required. Also used for end facing and chamfering.

Equipped with plain bearing rolls—solid cutter block—shank type mounting. Fits any type of turret lathe old or new. The details of the turner are shown on page 78 of the Warner & Swasey Tool Catalog.

If you do not have the new Warner & Swasey Tool Catalog, we suggest you write for it today—or better still, call in your local Warner & Swasey engineer, he will show you exactly what these tools will do to help you improve your turning operations and lower your costs.

WARNER & SWASEY
Turret Lathes
Cleveland

YOU CAN TURN IT FASTER, MORE ACCURATELY FOR LESS . . . WITH WARNER & SWASEY TOOLS

Production Perspectives

News of Mass Manufacturing from Everywhere

SHORTAGES in skilled machinists with a strong possibility of an ever increasing demand, has presented a more and more acute problem to Tool Engineers and productions officials who are charged with the securing of help to meet the increased demands, so apparent the last thirty days. There just 'aren't" any highly trained mechanics to be had seems to be the fact many factory officials have to accept.

Production schedules, everywhere, are up. Domestic orders for machine tools are double those of a year ago. New orders are coming into machine tool builders from a wide variety of machine tool using industries—reflecting, no doubt, the expectation of a constantly increasing production for fulfilling the peace time needs of this country. "For years," says Wendell E. Whipp, president of the Machine Tool Builders' Association, "in this country machine tool replacement has lagged far behind obsolescence . . . It is not surprising, therefore, that at the first sign of a business upturn, the manufacturers have begun to place machine tool orders designed to modernize their plants." In spite of the sudden demand there have been no general increases in machine tool prices.

Two important manufacturers' associations went on record as opposed to war. The National Machine Tool Manufacturers Association and the Automobile Manufacturers Association. The former passed a resolution indicating that Machine Tool Builders hold firmly to the conviction that real wealth is created only by the production of those goods and services which add to the possessions and the welfare of the people. Likewise, the Automobile Manufacturers opposed war on the basis that peace for all civilized people dictates that industry's concern should be in keeping this country out of war in Europe and that the interests of the automobile industry are unmistakably linked to peace. At the same time with European markets virtually eliminated as sales outlets, American Automobile Manufacturers are looking to markets on other continents to absorb a major part of their normal export volume. Latin America, logically, becomes a most promising outlet. South Africa, today America's most important outlet for motor vehicles, is another bright spot on the automotive horizon.

Intensive activity in the aircraft manufacturing field and restoration of wage cuts in the brass industry featured developments in Connecticut during October. Major brass and copper companies in Waterbury, Bridgeport and several other cities boosted wages about 10 per cent, restoring a cut put into effect in May, 1938. . . . United Aircraft Corporation announced plans for immediate expansion of its Pratt & Whitney Aircraft Division in East Hartford, adding 274,000 square feet of manufacturing space at a cost of $1,000,000. Vought-Sikorsky Division of United, in Stratford, is adding 800 new employees and has let contracts for a new building to be used as a press shop and foundry, to provide 10,000 square feet of floor area. . . . Farrel-Birmingham, Inc., Ansonia, is building a press for blanking out and forming the duralumin parts for all-metal airplanes. The press stands 26 feet high, has a bed measuring 96 by 133 inches and a maximum capacity of 2,200 tons under hydraulic pressure of 2,500 pounds to the square foot. The press may be operated by one man, but three or four are needed during forming operations. It is equipped with push-buttons for the pump motor, regulation of downward traveling speed, and various other control levers, all housed in a control station. . . . New Haven Clock Co., New Haven, is now working at full capacity for the first time in a number of months. . . .

A. R. Tulloch, Secretary Western Massachusetts Employers' Assn., said his office is receiving calls from employers organizations from Boston to New Haven, Conn., inquiring about the possibility of securing highly trained mechanics in Springfield, but he pointed out that apparently no one section in New England is better off than another in this respect, and little assistance can be given. At the same time it was indicated that in some factories the **age limit** for employment **is being raised and that men around 50 years old are being considered** by plants that a year ago would have nothing to do with them.

Close to **380 workers in the Boston and Albany Railroad locomotive shops in West Springfield have returned to their benches** with resumption of normal operations. The **outlook for the future business** was **bright,** plant officials said and unless the unforeseen develops it is confidently expected that the men will stay at their work until the first of the year. There was a slight increase in the number of workers called back.

The **Indian Motocycle Company** of Springfield is **preparing for an increase in production** in anticipation of increased activity through the prolongation of the European war. Loring F. Halsey, vice president and general manager of the company said that no orders from foreign governments have been received, but the firm is standing for its share of business from the U. S. Government and orders from abroad are expected momentarily. The embargo at its present status has no effect on the shipping of motorcycles to belligerents as they are not classed as implements of war.

George W. Prentiss & Co., Holyoke wire mills **is running at capacity** now as orders have poured in since the European war broke out. Fayette F. Read, secretary of the concern said that he anticipates record business for American industry.

Orders from private companies **amounting to $200,000,** enough **to keep the plant operating for three months at normal production rate,** have been

(Continued on page 54)

Mass production plants throughout the nation, everywhere, are going full tilt. Metal processing—machining—has increased by leaps and bounds, as witnessed by the night view, above, showing the Firth-Sterling Steel Company's carbide plant. Shipments of carbide tools and materials have doubled in the past thirty days.

Chapter Doings ▲ ▲ ▲ ▲

By George J. Keller

Well, that National and International function, the Semi-Annual at Cleveland, has "came and went" and I've just got to say a few words. Probably said too many at the Director's meeting. Couldn't help it, though, because if you birds had my job you would have felt the same way. Saw a lot of my old friends there in my wanderings. Saw that dignified "Simon Legree" of the Cleveland Chapter, Jack Howkey. Have known him for years and he's still a friend of mine, I think. Had a few minutes with Prex Riley Weaver and also "Barrymore" Tell Berna. To me the dinner was successful because I met Tom Fraser and Hal Reynolds whom I hadn't seen in 10 years. Also a guy from Detroit by the name of Whitehouse that I met at a clambake. Geo. Wise from Minnehaha gave me his sympathy. For that I'll like him always. Jim Reep was on his good behavior, thanks to my company. Dunked do-nuts with Roy Bramson, Mrs. B. and Andy Rylander in the wee hours of the morning. Connie Hersam was still talking when I left. I'm off Ben Brosheer for life—he wouldn't take my picture. Ot Winter was in his glory, he sat next to a college professor at dinner. Had a chance to renew old acquaintanceship with Charlie Codd and Jack Lynch. U. S. James and Charlie Staples plus Floyd Eaton made Detroit conspicuous. Ford Lamb was there of course, but he doesn't belong to Detroit. He's a national individual. Hank Eisele, Eddie Gangwere and Dinger were there to back up our President. Oh, I could go on for hours. Gosh, but I did miss George Smart. You missed something, fellows, it's the greatest place in the world, this semi-annual, to meet up with old friends. And here's No. 1 news item that was given me by one of my hardest working spies. A certain grey haired individual, who is, or has, rubbed 50 pretty close and who is one of our most ardent workers, has other accomplishments besides being a good Tool Engineer. His oldest offspring is about 24 years of age and just the week before the semi-annual he again increased his allowance for dependents by another addition to the family. That's beating the income tax collector. I'd like to tell you his name but he has a murderous glint in his eye when mad. If I do not get a comeback from him, I'll give you the name and the date of the new arrival in the December issue. Oh, I forgot to mention the shows—they were both good. Got acquainted with Toronto Thompson and one of these days I'm going to look over his gang. If I've overlooked any of you guys, as Robert Service says, "Don't mind that part of it." It wasn't intentional.

Editor's Note: In order that any events or any material for this page can be published in the issue following its occurrence, this information must reach me not later than the 16th of the month preceding publication month. Geo. J. Keller, 658 Ohio Street, Buffalo, N.Y.

Buffalo's third annual Stag Outing was a "smashing" success— ask a certain three members who attended. Otto Winter, it seems according to the picture, is an accomplished banjoist when playing the Beer Barrel Polka.

Tri-City members had a real turnout for the October 11th meeting at the Fort Armstrong Hotel, Rock Island. They did the usual work with the knife and fork at 6:30 P.M. and then had a mighty fine time listening to Dr. Thomas, Research Engineer of Westinghouse, talk on recent scientific developments and seeing his demonstrations of "Cold Light," "Pouring Music," etc.

One hundred and fifty members and friends attended the October 16th meeting of **Schenectady** chapter. G. H. Sandborn, Fellows Gear Shaper Co. gave an interesting talk on New Developments in Involute Gearing. A sound movie "General Electric Means Business" was also shown. After a short business session, Don Saurenman presented 18 lantern slides showing various Tool Engineers caught unawares at the annual clambake. Enders, Bernadt, Chairman Ernest and others were shown in interesting poses. Don's breezy intimate comments were greatly enjoyed.

The October 10th meeting of **Cincinnati** chapter was held at Ohio Mechanics Institute with the students attending as well as members and friends. Chairman Weber reported on the semi-annual meeting and gave some plans for the coming year. Cincinnati chapter news is now on a paying basis. Mr. A. J. Scheid, Columbia Tool Steel Co. presented colored motion picture films on the making of tool steel which gave everyone a good idea how tool steels are manufactured and stocked for sale. After the pictures there was quite a discussion and then refreshments were served.

Hello—**Toronto**—Friday, October 13th doesn't mean a thing to our International friends. 75 attended dinner and about 100 heard Hans Ernst give an interesting talk on the Action of Metal Cutting. Art Lambert donated the use of his projecting equipment and later ran a color film of his trip from New Brunswick to Vancouver, part of which was made by plane. The visitors showed much interest and several membership applications were received.

For their October meeting **Cleveland** chapter were hosts to National and International Tool Engineers. Chairman Jack Hawkey graciously backed down and gave credit for the successful arrangements to his infield, Briner to Denning to Fitzsimmons, who scored a hit with the floor show, especially the last act put on by a member of the Cleveland chapter.

Rockford held its October meeting in conjunction with the Rock River Valley Engineering Council. On the 13th and 14th at the Faust Hotel. It was the biggest thing yet for this chapter. Plants were visited on the 13th by all those who could get away. 650 men were registered, 28 exhibits were shown, 300 attending the dinner and were entertained by Axel Christianson, Swedish entertainer from Chicago. He went over big. You can readily guess why. J. R. MacDonald, Caterpillar Tractor Co. and John J. Caton, Chrysler Institute were the speakers. Thus ended the first day at 11:30 P.M. On Saturday the 14th, there were more plant visitations in the morning and some very fine papers were presented by Robert Hattis, K. A. Taylor and William Lathers in the afternoon. The evening was taken up with entertainment at which the members and guests of all the societies brought their ladies. (Doc Oaks with the aid of his "goofey gadgets" lectured on the proper way to become an inventor.) The Svea Soner Singing Society filled out the program. The entire session was a big success.

Greetings—**Los Angees**—This new chapter we hear is having growing pains. At 4 months of age there are over 90 certified members from 24 various industries. Most of the sub-committees have been appointed and are beginning to function. The permanent meeting place has been established and the regular meetings are to be held on the fourth Thursday of each month. Chairman Lou Biehler attended the semiannual meeting at Cleveland. The membership committee has adopted the slogan "Watch Us Grow."

Chicago chapter held its most successful meeting on Monday evening October 2nd with over 400 attending. James R. Macdonald of the Caterpillar Tractor Co. sure gave a bang-up talk on the subject of "Tool Engineering" and the film he showed was very interesting. There was also a splendid exhibit of Caterpillar products. They sent two men to take care of the exhibits and answer questions relative to the manu-

(Continued on page 48)

MUCH STRENGTH IN LITTLE SPACE

When space limitations are severe but strength requirements rigid, designers are faced with a major problem. The use of Molybdenum steels has solved many such problems.

A manufacturer of industrial haulage trucks, for example, was up against that very situation. The drive shafts of this equipment must stand considerable abuse. Quick acceleration and sudden stops are the rule rather than the exception. And space is at a premium.

This manufacturer found in Nickel-Chrome-Molybdenum steel exactly the qualities required — high strength, which permits relatively small section, plus an exceptional combination of toughness, ductility and fatigue strength. The machineability of this steel in the heat treated condition keeps fabrication costs down.

It will pay you to re-check your material specifications in the light of present knowledge of the qualities and characteristics of Molybdenum steels. Our helpful book, "Molybdenum in Steel", is sent free to interested production executives and engineers on request.

PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

Climax Mo-lyb-den-um Company
500 Fifth Avenue, New York City

MOLY

IT'S NEW

The Tool Engineer (buyer) looks at new equipment. A practical manufacturing executive has gone over the entire field to bring you on this page each month, those items he feels are of importance and interest to the Tool Engineer at a time when production is at a high peak, and equipment buying is reaching an all-time high.

NEW Cincinnati No. 0-8 vertical milling machine claimed to be ideal for rapid and accurate milling of work that can best be handled on a small vertical type miller, the new Cincinnati No. 0-8 Vertical Milling Machine, is particularly profitable for either rapid production or job lot production of small parts of firearms, sewing machines, refrigerators, cash registers, business machines and similar units.

Equipped with both hand and power table movements and with adjustable vertical spindle, the machines are powered with a 1 HP. motor for the spindle drive and a ¼ HP. motor for the table drive. The machine is mounted on a cabinet base providing a convenient table working height for the operator.

Pleasingly modern, the machine is of fixed bed type construction, with bed and column of mechanite casting, adequately ribbed for added strength and maintenance of new machine accuracy by continuity of relative alignments.

All rotating shafts of the table drive and vertical spindle head mechanism are mounted on anti-friction bearings, gives a smooth, efficient drive, insuring accurate performance, long life and low maintenance cost.

Eight spindle speeds range from 150 to 1300 R.P.M., are easily selected with interchangeable four-step pulleys on spindle drive shaft and on motor drive shaft. Vertical spindle is driven by independent constant speed motor mounted at rear of vertical spindle head.

The vertical spindle, with National Standard spindle nose with the No. 40 Series taper hole, is fitted in a movable large diameter heat treated alloy steel quill mounted in the vertical spindle head. A 4" vertical adjustment is by a hand lever which actuates a gear meshing with an accurately cut rack, integral with the quill. A hand lever on the left side of vertical head provides a positive clamp of the quill in any position. Built into the vertical head is a stop arrangement for limiting the quill movement to pre-determined distances for accurate step milling.

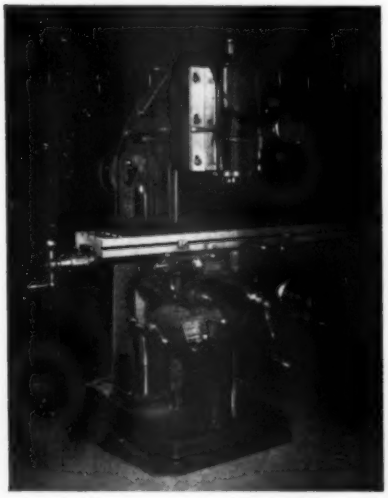
Two series of eight table feeds are available. The low series ranges from ½" to 5⅛" per minute and the high series from 1" to 10¼" per minute. Feed changes are made with pickoff gears at front of machine bed. The range desired is optional at the time the machine is ordered. Power rapid traverse is 100" per minute and is constant regardless of the feed selected, engaged by hand levers located on the right hand side of the machine bed.

The standard table working cycle is: power rapid advance, engaged by hand; power feed engaged by hand; reverse by hand movement of directional control lever; power rapid return, engaged by hand. The table can be moved accurately by means of handwheels, graduated in thousandths of an inch, located at each end of the table. One revolution of the hand wheel moves the table .250".

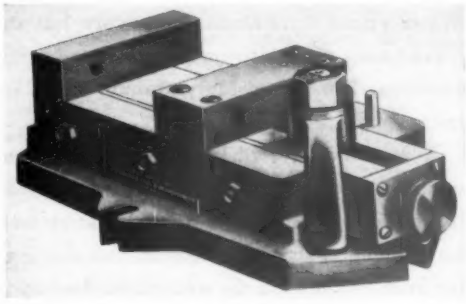
A similar hand wheel, graduated in thousandths of an inch, and located on the left hand side of the vertical spindle head, gives accurate control of cross movements of the vertical spindle head. Further accuracy of cross movement is assured by adjustable stops fitted in the vertical spindle head which act against a fixed block fitted in the column casting and located on the right hand side, back of the hand lever, which is used to clamp the vertical spindle head in any cross position.

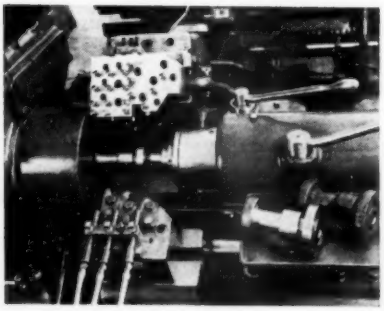
Complete automatic lubrication is a feature of these machines. A plunger type pump, driven from the table feed drive shaft, lubricates all moving parts. Oil is forced to the upper spindle drive bearings, then by splash and gravity to all parts of the vertical spindle head. Lubricant is fed to a reservoir in the bed from which it flows by gravity to the hand scraped table bearing ways, feed gears and table mechanism. A small pocket like reservoir at the front of the vertical spindle head provides lubricant for the spindle bearings by means of a needle valve and drop sight gage. A supply of lubricant is maintained at all times in this reservoir and insures immediate lubrication for

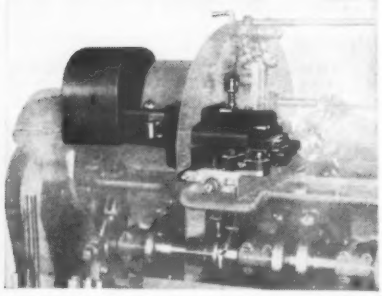
(Continued on page 64)

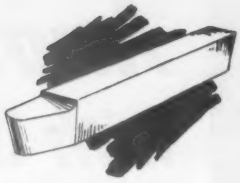


Left: The New Cincinnati Vertical Type I. Milling Machine. Below: Close-up view of the new Fay automatic 16" Lathe, recently announced by Jones & Lamson Machine Company. Below — right: The new Brown & Sharpe thread chasing attachment. Right: Chicago Tool & Engineering Co. new 2½" production vise for high production use in milling, drilling and grinding operations. The new vise has an adjustable cam locking lever, permitting loading and unloading in "jig" time.



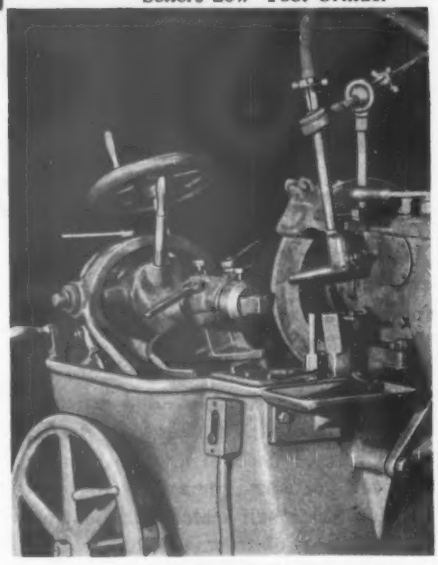






Why pay "machinist wages" for *Tool Grinding?*

Sellers 20W Tool Grinder



OF course, machinists like to grind their own tools . . . they also have their own ideas of how tools should be shaped and what clearance they should have. All of them cannot be right—a machinist at best seldom grinds two tools alike.

Why pay skilled machinists to grind tools? An expensive machine stands idle . . . production is held up! Have your tool room attendant do this job. With a Sellers Tool Grinder, he can grind tools better than the best machinist can by hand . . . and in less time. Less tool steel will be wasted and the tools will last longer and cut better. And your machinist can be kept on the work you are paying him to do.

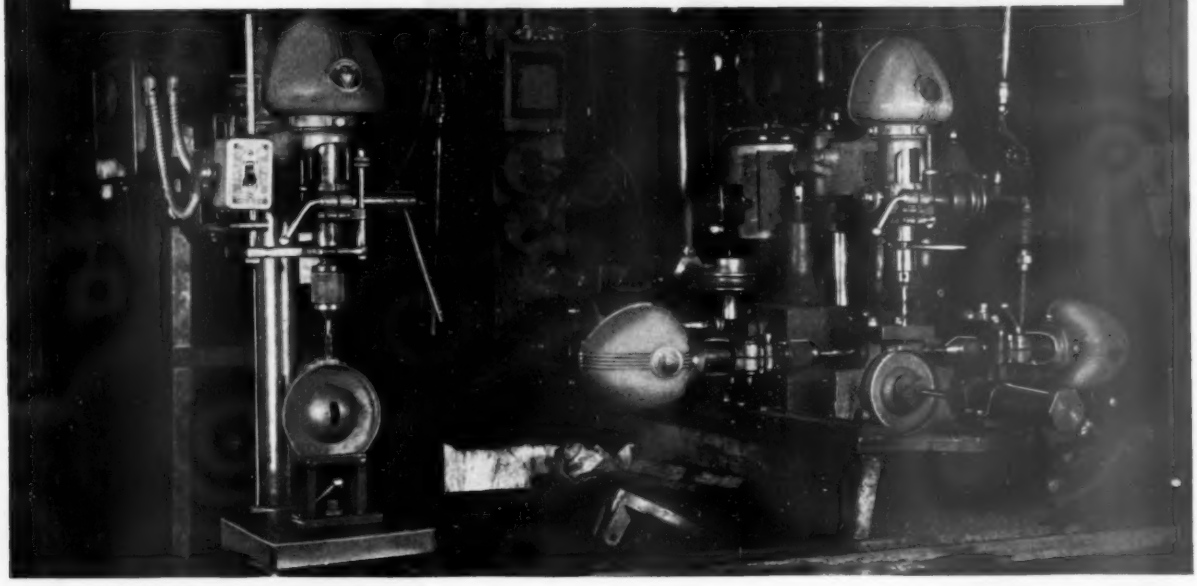
If you are looking for a way to save money and keep production at peak, we know you will want more information about Sellers Tool Grinders.

WILLIAM SELLERS & CO. Incorporated
1626 Hamilton St. - - - Philadelphia, Pa.

FOUNDED SELLERS 1848

Sellers

Another SPECIAL SET-UP with DELTA Low-Cost DRILL PRESSES



CLEVER USE of these Drill Press Heads is saving plants *THOUSANDS OF DOLLARS!*

Alert production men all over the country are utilizing this new method for building special set-ups at a fraction of former costs. Delta 14" and 17" Drill Press heads can be purchased separately — and assembled in any combination that best fits your needs. They can be used in any position — vertical, horizontal or at any angle — because their self-sealed ball bearing construction eliminates lubrication problems. Their low cost makes them more economical than anything that can be made up in tool rooms or machine shops. Delta sensitive drill presses that cost less than $50 are doing work today that $150 drills would not handle a few years ago! They're not merely new tools — but a NEW TYPE of tools. It will pay you to investigate.

Send for NEW DRILL PRESS BOOK

Mail coupon for latest Delta Drill Press Book. It contains specifications and prices of complete line of Delta Drill Presses plus details on individual parts from which you can make your own low-cost assemblies.

$43.55

No. 1289—Floor type Slow Speed 14" Drill Press with ½" Chuck and Standard Tilting Table (without motor).

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Gentlemen: Please send me your latest Delta Drill Press book which contains specifications and prices of your complete line of Drill Presses.

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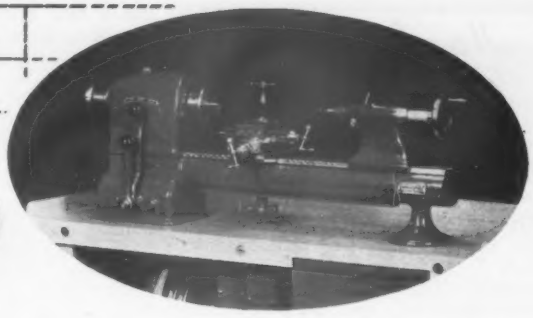
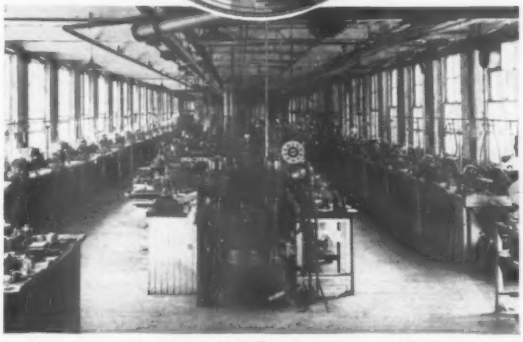


8-LETTER WORDS
MEANING *Accuracy*

HAMILTON
HARDINGE



A section of Hamilton Watch Tool Room showing Hardinge Cataract Precision Bench Lathes

Hamilton skilled craftsmen at work on Hardinge Cataract Precision Bench Lathes

Close-up view showing diamond grinding of hole in a die part for making wheel die

In one of the world's finest equipped tool rooms, precision-trained craftsmen make the dies and tools used in the manufacture of the famous Hamilton Watch, known the world over as the dependable-accurate time keeper. . . "the Watch of Railroad Accuracy."

The intricate and delicate parts of the Hamilton Watch require accurate tools—Hardinge Preloaded Ball Bearing Bench Lathes assure this essential quality. Precision turning, grinding, diamond boring, lapping and many other operations are performed continuously each day with these modern machines.

Read what Mr. C. W. Coslow, Mechanical Superintendent of the Hamilton Watch Company wrote:

"You will be interested to know that the highest precision grinding and other work is completed on the Hardinge Cataract Lathes with preloaded ball bearing spindle construction. This is a point on which we were, frankly, skeptical when your first Lathes were purchased, but experience has proved that our Hardinge Cataract Lathes are thoroughly reliable for this type of work and can be depended upon for accuracies to within .0001". The prejudice in the minds of some of our oldest and best die-makers against changing to the modern Cataract Lathes has entirely been overcome, and I feel sure that after two years' experience that our best men would consider it a demotion if they were transferred from the Hardinge Cataract Lathe."

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

CHICAGO - NEW YORK - PHILADELPHIA - DETROIT - HARTFORD - CLEVELAND

Precision Machine Tools Since 1890

Handy Andy Says —

Flashes of the Semi-Annual. Greetings and handshakes, orderly confusion, Directors and Committee meetings, with N.Y. copping the '40 meet. The banquet, with the Stars and Stripes nodding to Canada and the Union Jack. A bit of friendly give and take between Jim Weaver and Tell Berna of the N.M.T.B.A., the latter showing excellent cause for cancelling the show. (Just the same, a lot of us wish they hadn't.) A welcome by Frank O. Wallene, pinch hitting for Hizonor who was out opening a new bridge; greetings by Geo. Hawkey, Cleveland Ch'man. A snappy outline on Tools and Employment by Prof. John Younger and a rousing speech by husky Hamilton Fish espousing neutrality but promising a warm reception to invaders. A fine floor show, clean, entertaining, different, quite up to A.S.T.E. standards. The feature was a rhumba by A.S.T.E.er Louis K. Voelk (Cleveland P. & J. Representative) and Mrs. V. May the years glide by as gracefully for all of us! (Sotto voce): What I liked best about Ham. Fish's talk was his reminder that ours is a Republican form of government. (Constitutionally, that is). As you were, America!

▼ ▼ ▼

Me, I saw it all from the sidelines; relieved of official cares saw the town, window shopped, browsed in book stores, ate well, slept well and behaved well. Cleveland's a nice town with funny left turns and scads of women with notebooks, hunting treasure. Thanks to Ch. Theide and Larry Howe, Lee Diamond and I (the four of us, that is) supped at the Alpine Village, with its good food, mellow atmosphere and unique floor show. Take it in when in Cleveland. Dick McLain hosted for Statler, made us all feel at home. You know, I like that house; it's spick without being too span, meaning that gentlemen play with discretion. Irrepressible Connie Hersham (N. B. of Philly and the Scotch Finders) stole the show from the Hounds, who garnered a few members regardless. If only Slim McClellan had been there! But Mac was ill, which doesn't mean you can hold a good man down. Lou Webber of Cinci. wants his home town mentioned now and then. Get your gang to send the news in, Louis—on time!—and you'll be there with the rest. And, on Geo. Keller's behalf, that goes for everybody. Get it in on time!

▼ ▼ ▼

Touring the states—and crossing the border—shook hands with Lou Biehler, L.A. Ch'man, and Arnold Thompson of Toronto. A recent comment about my new home must have struck a responsive chord, a number of the boys mixing condolences and congratulations. (They had exactly the same experience with the %‡*$ builders) Give the Tool Engineers credit; they like their fun and, working hard play hard when let loose, their women can trust 'em to put mamma and the home first. East, west, hame's best. P. H. Sweet, Diamond Chain, Indianapolis, aspires to a Chapter in that town, Roy Bramson having talked to him confidential like. Roy's on the job, plenty. Ol' King Cole **is** a merry ol' soul, and it's not true that Geo. Wise was scalped. He lost his by wear and tear, same as I did. Gosh, for a thatch like Frank Crone's! U. S. James, having raised one of those mustaches, flew to and fro, perhaps looking for new worlds to conquer. Technical press well represented: Don James of Iron Age and a slew of Pop Van Deventer's clippings, veteran Eric Oberg of "Machinery," smiling Ben Brosheer of "American Machinist," and of course, THE TOOL ENGINEER staff. It's a force in the land, the technical press, like our speakers, we wage an educational campaign among the educated. We're going to change all that, given time.

▼ ▼ ▼

New members coming in fast, the sideliners lose contacts. But names click, eventually become reconciled with faces. Then, there is the pleasure of meeting friends; "Doogan's Old Man," as he signed himself on my souvenir bottle, genial Ed Dickett, eager Floyd Eaton, sturdy Herb. Hall, the quiet Mitchell, others. A great gang. Ray Morris, Hartford, sent regards from John Sundkvist, with whom I worked at P. & W. back in '10 or so.

(Continued on page 36)

"Well pleased with this Davis Boring Tool"—

DE WALT PRODUCTS CORP.

Featuring: Sturdy, Rigid Construction—Extremely Fine Cutter Adjustment

The photograph and blue print above illustrate a very practical and efficient application of Davis "Super" Micrometer Expansion Boring Tools.

DeWalt, manufacturers of High Speed Woodworking Machinery, have selected the Davis "Super" tool for this job (boring gear housings), because it was necessary to hold a tolerance of .0002". In writing us about this set-up, they comment, "Needless to say, we are well pleased with this bar."

This new Davis "Super" Boring Tool—a complete innovation in boring tool design—features sturdy, rigid construction as well as extremely fine cutter adjustment. Undoubtedly this special Davis tool can be adapted for efficient, accurate, economical use in YOUR plant.

Send us prints of your special or unusual work and, without obligation we will submit you a helpful, specific recommendation. Davis Boring Tool Division, Larkin Packer Company, Inc., St. Lous, U.S.A.

DAVIS

BORING TOOLS

Announcing *The NEW*

Barber-Colman

Vertical
HOBBING MACHINE

For combined high production, precision and finish; quick change-over; maximum work from each hob . . . the Barber-Colman Type V Vertical Hobbing Machine presents many new and profitable possibilities.

Vertical Design — Unique vertical design of the Barber-Colman Type V contributes to simplified construction, saves floor space, gives complete accessibility from front and rear. Large, deep-section columns are twin pillars of strength, solidly secured to the deep, heavy base and capped by a rugged crown member . . . makes frame of enormous strength and rigidity. Other advantages occur naturally because gravity intensifies stabilizing effect as the work-slide feeds *upward*, aids rapid traverse *downward*; causes chips and coolant to fall directly into the chute provided for them.

Automatic Cycle — The automatic operating cycle combines most effectively, *hydraulic* pressure for actuating the hob carriage, clutches, and clamping means . . . *mechanical* drives to hob spindle, and screw-feed . . . *electrical* drives to hydraulic unit, coolant pump, and work-slide rapid traverse. Cycle includes conventional or climb cutting as determined by setting controls.

Easy Set-Up — No time need be wasted in setting up a B-C Vertical. Speed, feed, and index gears can be selected quickly, mounted easily. Positive depth of cut, and movement of work-slide, are established by simple adjustments. Central controls give operator complete command of individual movements in cycle.

High Quality — Barber-Colman high standards for materials and workmanship are maintained consistently. Shafts are short; gears are hardened and lapped, run quietly at high speeds; drive shafts are mounted on anti-friction bearings. All of these advantages contribute to the establishment of new high production records, while maintaining extremely close limits of accuracy and providing a new high degree of fine finish on mass-production work.

BARBER B-C COLMAN PRODUCTS
HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, MILLING CUTTERS, SPECIAL TOOLS

Barber-Colman Company
General Offices *and* Plant, Rockford, Illinois, U. S. A.

Type V

BARBER-COLMAN

BARBER B-C COLMAN

Above: Front view of the new Barber-Colman Type V Vertical Hobbing Machine. Left: Bulletin F-1645 fully describes and illustrates the many features that make Type V an outstanding producer. Write for a copy, today.

BARBER-COLMAN COMPANY, General Offices and Plant, Rockford, Ill., U. S. A.

HANDY ANDY SAYS

(Continued from page 32)

Incidentally, John relayed greetings from Ivar Eklund, former A.S.T.Eer and Midland C. E. who is doing quite well in his native heath. Ek. greets the gang. Well, they're girding for war there, too, now, the expansionist screwballs giving 'em no peace. But it'll be no Munich, or I miss my guess.

▼ ▼ ▼

Art Francisco, of Haberkorn & Wood, Detroit, dropped in after vacationing up among the W.P.A. cottages in the Upper Peninsula. (At least, so I gather from his post cards.) Anyway, he aromed of pine tang and outdoors, looked fine. Frisco has a handshake (something like Geo. Keller's) that thrills the ladies, is a team mate of Bill Maier who is a past A.S.T.E. Director and a booster for the Society. The H. & W. outfit represent Tomkins-Johnson, of Jackson, Mich., makers of hydraulic and pneumatic equipment, riveters, hoppers and so on, and, like old wine, improve with time.

▼ ▼ ▼

Here's one for the Hydraulic specialists: Carl Bjorling, engineer with Equipt. Dev. Div., R.C.A. Mfg. Co., Harrison, N.J., writes me re an article of mine—"The Trend to Hydraulics"—in April TOOL ENGINEER. He wants info on pumps and pressure units, cylinders, valves, press and die appliances (hydraulic) etc. I gave him a list from our advertisers, but the field is open to any of our readers. Kindly mail him literature and comprehensive data, and, if you have time, let me know disposition, so that I can follow up with suggestions. Please! And Carl, if the boys don't use you right, let me know; I forgive my enemies but remember my friends.

▼ ▼ ▼

"What I like about THE TOOL ENGINEER, among other things," said a visiting sales representative, "is that it circulates among the rank and file. It reaches the members, from the big executive to the man on the board. And tracing enquiries (we're canny that way) I have found that several good orders resulted from recommendations by designers and men out in the shops." Well, I've had that idea right along, having established my own controls, so to say. The T/E is read, have no fear of that. For instance, a little mention of a cocker spaniel pup got me in Dutch with the wife and the plant chief copper—let alone a ribbing from the boss—a/c the many offers of a pooch ranging from Mex. hairless to Great Danes. You see, THE TOOL ENGINEER gets results.

▼ ▼ ▼

Apropos of this, let me reiterate that these little gustos are all friendly and in fun, started because one reminiscence led to another. And the responses have been so spontaneous, so friendly in turn that it's a pleasure to pick out some name at random, as a sort of surprise package. But, there is no ulterior motive, no acquisitiveness. So, if I mention cows or goats, cameras, fish, calendars (well, calendars perhaps excepted, especially strip teasers to rib the censors with) guns and what have you, why, that's just incidental in connection with some hobby of the party mentioned. I get my reward out of the friendships created by this column. Well, so much for that. Ed Harper (Natco) dropped in on me the other day, incidentally meeting Jack Adams, a close neighbor of Ed's who has admired his fine lawn. Anyway, Ed perked up when he saw Bert Carpenter's postal in the T.E., came in to show me a few of his own from Paris and Stockholm. You see now, don't you, what makes this a friendly Society? It is that spirit which makes us grow and grow, bigger and better.

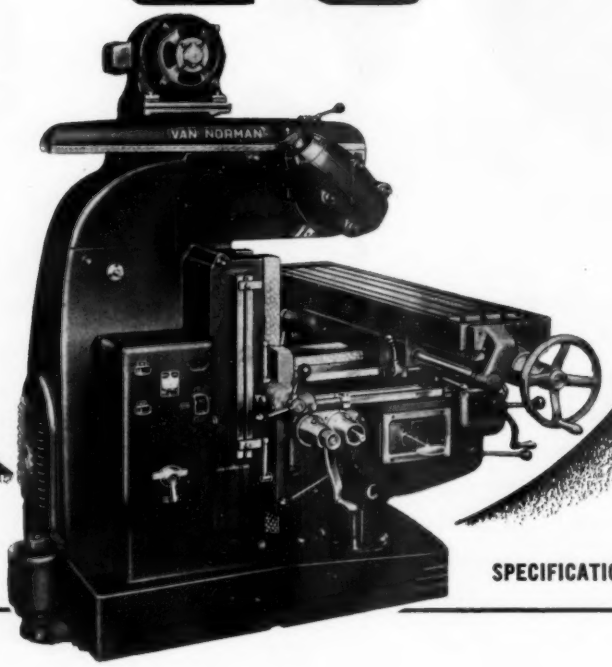
Yours for Progress,

Handy Andy

U. G. Thomas Makes Change

Urving G. Thomas, among the first to affiliate with the first (Detroit) chapter of the A.S.T.E. recently joined the staff of the Morse Tool Company in Detroit. Mr. Thomas has had many years of experience in manufacturing, serving at one time as factory manager of the Lozier Automobile Company and as a general superintendent of the Pierce-Arrow Motor Car Co.

26



SPECIFICATIONS—Table: 50" x 12"

The swiveling cutterhead . . . sliding ram . . . front and rear controls . . . 6-way rapid traverse . . . greater selection and range of feeds and speeds . . . greater rigidity . . . extreme accuracy . . . and many other features of the *new* No. 26 Van Norman Universal Miller, all combine to reduce overall completion time of work milled, and cut your costs. Write for Bulletin.

VAN NORMAN

MACHINE TOOL CO., SPRINGFIELD, MASS.

MACHINES MAKE WORK

(Continued from page 18)

23 per cent more workers than it did in 1926.

Further evidence of the effect of technology in creating employment is to be found in the fact that unemployment is more severe in the occupations in which little or no machinery is used and which have not had the benefit of technological development.

A steam shovel gouged up a ton of earth, swung an arc of 90 degrees and dropped its load into a waiting truck. A spectator commented:

"This steam shovel bothers me, it takes the place of a hundred men working with hand shovels."

From the man at his side came this meaningful reply:

"Yes, and it takes the place of 10,000 men working with teaspoons."

There is no reason to believe that if a machine doubles output per man it cuts employment in half. Labor saving is a minor aspect of a vast amount of technological advance today. Machinery is labor serving rather than labor saving. Thousands of examples can be cited of machines increasing output and multiplying employment many fold.

Take the case of the steam shovel, for instance. Most earth handling in the United States is in connection with road building. Has employment there declined with the development of the steam shovel? Would it increase if the steam shovel and similar machines which make it possible for us to afford extensive building were discarded for hand labor?

The answers are obvious to any thoughtful person. A larger percentage of the population has found livelihood in road construction and maintenance in recent years than ever before in history. Technology, represented by the steam-shovel, has enabled us to develop products and services unknown to civilizations that depended solely upon hand labor.

There is no end to the evidence that machinery is labor serving. The advance of technology has given us new commodities and services; it has increased wages; it has reduced prices; it has reduced the work week; it has practically eliminated child labor; it has reduced industrial accidents; and it has increased employment opportunities. The machine is man's most capable and productive servant.

San Francisco, California—Chartered October 17th

San Francisco had chartered on Octoer 17th the second chapter on the Pacific Coast—to be known as Golden Gate Chapter No. 28, American Society of Tool Engineers. Memership in the chapter is represented in the entire San Francisco industrial area, including Berkeley, Oakland, San Leandro, Emeryville, Newark and Palo Alto.

Officers of the chapter are Carl W. Horack, Chairman. Karl L. Bues, Vice Chairman, Walter Kassebohn, Secretary, and Floyd B. Petteys, Treasurer.

Joe Siegel Goes on the Firing Line

The many friends of Joe Siegel, popular first A.S.T.E. President and Entertainment Chairman par excellence, leaves Packard Motor to join Leland-Gifford as sales engineer. He will cover Detroit and the state, as well as northern Ohio and adjacent Indiana territory. Joe, a prime mover in the Society, has been with Packard over a period of years, has been engineer on Standards and Chassis Processing as well as Asst. Chief Tool Designer. Sincere, likeable and level headed, he has a broad knowledge of tools and their uses.

Opens Detroit Office

John S. Barnes Company of Rockford, Illinois has opened a Detroit office at 503 New Center Building. Arnold J. Werner is in charge. He has represented for the past several years the Barnes Hydraulic interests as a sales engineer with H. R. Krueger & Company. The complete line of Barnes Sliding Head Units, Drilling and Boring Units, Square Ram and Self Contained Units, manufactured by the W. F. & John Barnes Co. will also be sold exclusively through the new Detroit office.

It's the GREENLEE

6-SPINDLE *Automatic* SCREW MACHINE

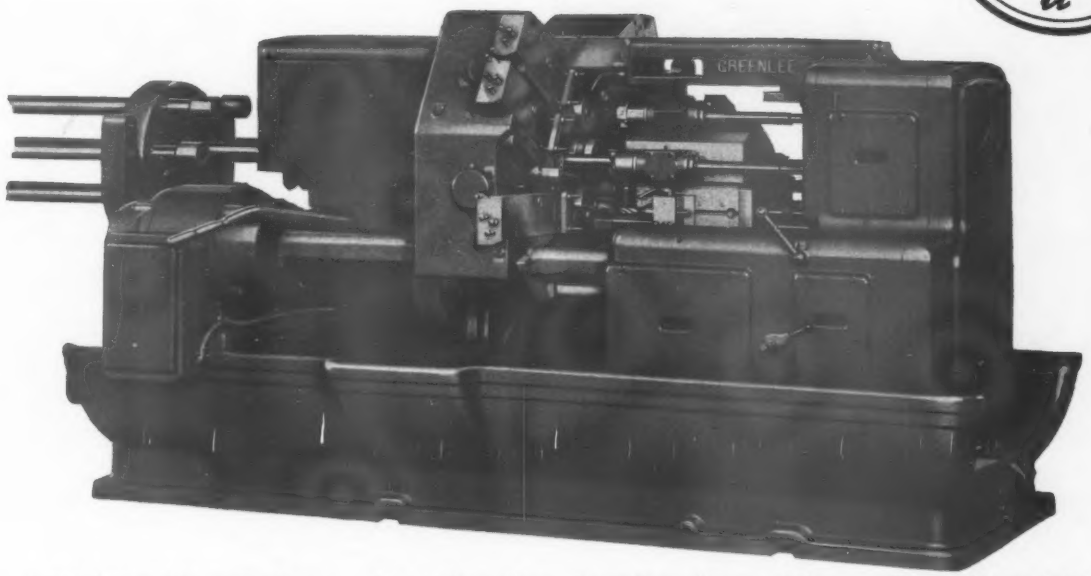
For Speed and Profit-Making Performance

Latest

IN

ACCESSIBILITY
FLEXIBILITY
COMPACTNESS
QUICK SET-UP
CONTROL

Let us tell you all about it



Interchangeable camming . . . Six independent, forged steel cross slides . . . Pick-off type feed gears . . . Thread or tap in four positions, high speed drives in all six . . . Simplified tooling . . . New stock reel feature. . . . Built-in set-up lighting . . . Automatic cycling stop. These and many other important features, built around a sound basic design, which has been proved under many operating conditions in the Greenlee Four-Spindle Machines, make this the outstanding "Six" on the market.

4 and 6-Spindle Automatics - Special Machinery

Greenlee BROS. & CO.

ROCKFORD, ILLINOIS, U.S.A.

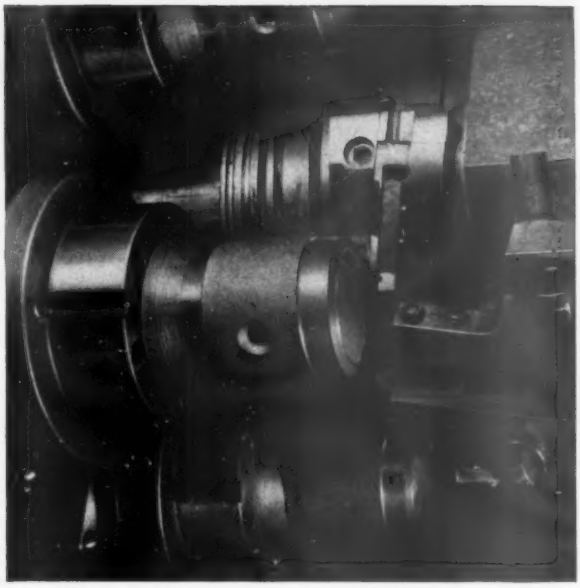
Multiple-Spindle Drilling and Tapping Machines

Haynes Stellite alloy tools are standard on these automatic jobs *because* they reduce the cost per piece machined

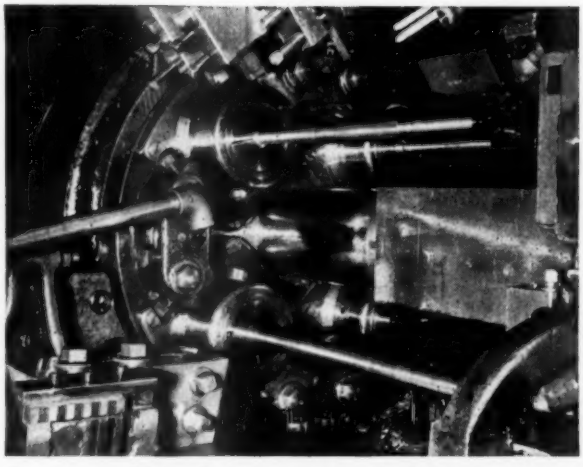
•

Haynes Stellite engineers are widely experienced in production work. They will gladly help you select the most economical cutting tool for each operation.

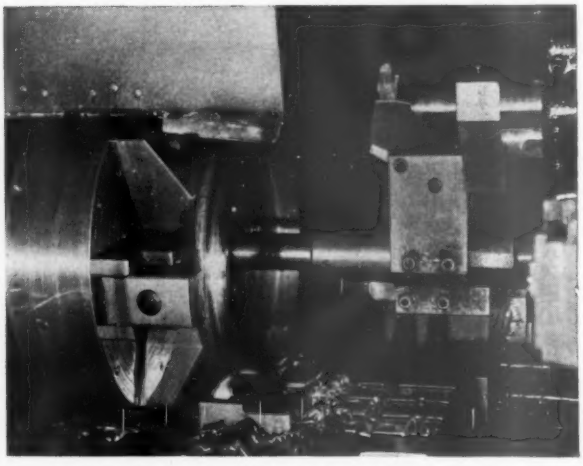
PRODUCTS OF A UNIT OF
UCC
UNION CARBIDE AND CARBON CORPORATION



Turning the O.D. and dome of automotive pistons with Haynes Stellite J-Metal solid tool bits on an automatic.



Forming a ½-in diameter motor shaft from 13/16-in. cold drawn bar stock with Haynes Stellite J-Metal solid tool bits on a 4-spindle automatic.



Turning the O.D. of a 15¾-in. Nitralloy reduction drive gear for an aviation engine with a Haynes Stellite "2400" solid tool bit in a turret lathe.

J-METAL
HAYNES STELLITE

Red-hard, wear-resisting alloys of cobalt, chromium and tungsten

2400
HAYNES STELLITE

HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

UCC

Chicago · Cleveland · Detroit · Houston · Los Angeles · New York · San Francisco · Tulsa

General Office and Works—Kokomo, Indiana
Foreign Sales Department—New York City

Haynes Stellite hard-facing rods and information on other Haynes Stellite Company products also are available through all apparatus shipping points of The Linde Air Products Company

"Haynes Stellite" and "2400" are trade-marks of Haynes Stellite Company.

18 DIFFERENT BORING AND TURNING JOBS-- DONE WITH ONLY ONE SET OF WETMORE TOOLS

--TIME AND MONEY SAVED FOR LARGE IMPLEMENT MANUFACTURER

These Features Made This Performance Possible:

—adjustments made faster than on any other tools used in this plant which means dollars saved in set-up time and increases productive time of operator.

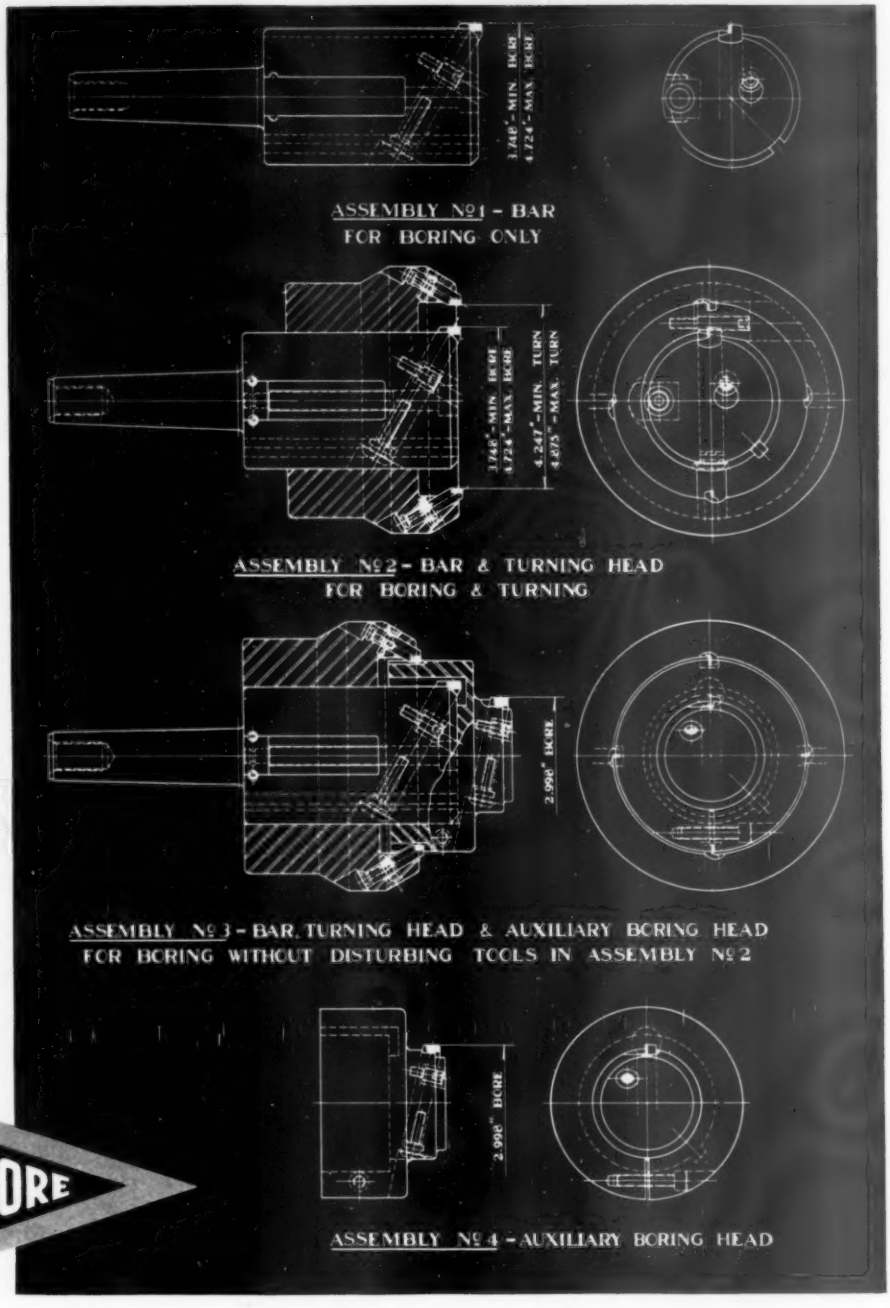
—extremely accurate adjustment made by means of adjusting screw; Wetmore patented wedge-lock holds cutting tools rigidly and solidly.

—tools illustrated bore and turn 18 different jobs:

Assembly No. 1—used for boring on 5 jobs.

Assembly No. 2—used for boring and turning 9 jobs.

Assembly No. 3—used for boring 4 jobs.

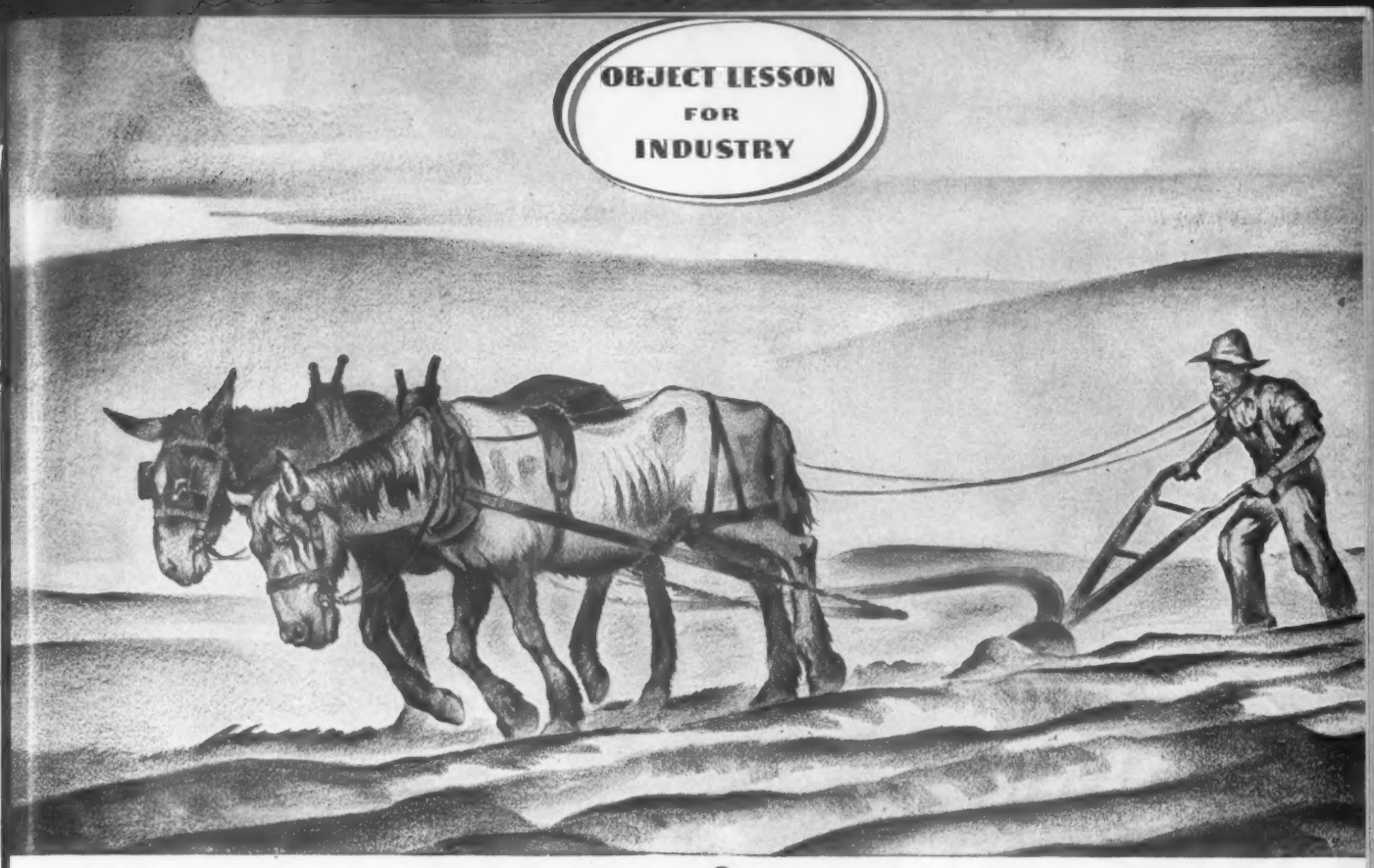


WETMORE

Send in your drawings—Wetmore engineers will design tools to reduce tool-setting time and cost per piece machined. See your Wetmore representative for many other surprising applications.

WETMORE REAMER COMPANY

Dept. TL 420 North 27th Street **Milwaukee, Wisconsin**



A GOOD MAN CAN'T DO MUCH WITH A POOR TEAM

(BASED ON THE ARTICLE, "A MAN AND A TEAM", BY WENDELL E. WHIPP.)

THE farmer—no matter how good he is—knows he can't turn out a full day's work with a broken down team.

A top lathe hand can't do his best work if his machine—the other half of his team—is old or inefficient.

Both know what's wrong with their production. But, the farmer may not be able to buy good horses, or, a tractor—and the lathe hand hasn't the authority to buy a modern machine!

BUT you have . . . you can . . . and you should!

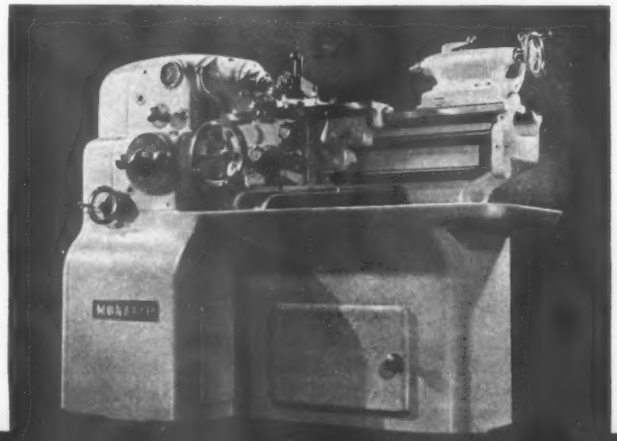
And you would if you realized that it's not the production you're getting that counts . . . but what you're NOT getting that affects your net profits.

If you net an average of 5%—what does it cost you . . . in cold cash . . . when, because of old machine tools, you FORCE your operators to produce 25% to 50% less than they should?

Can you afford to ignore those old machines? May we send one of our PROFIT ENGINEERS over to your office?

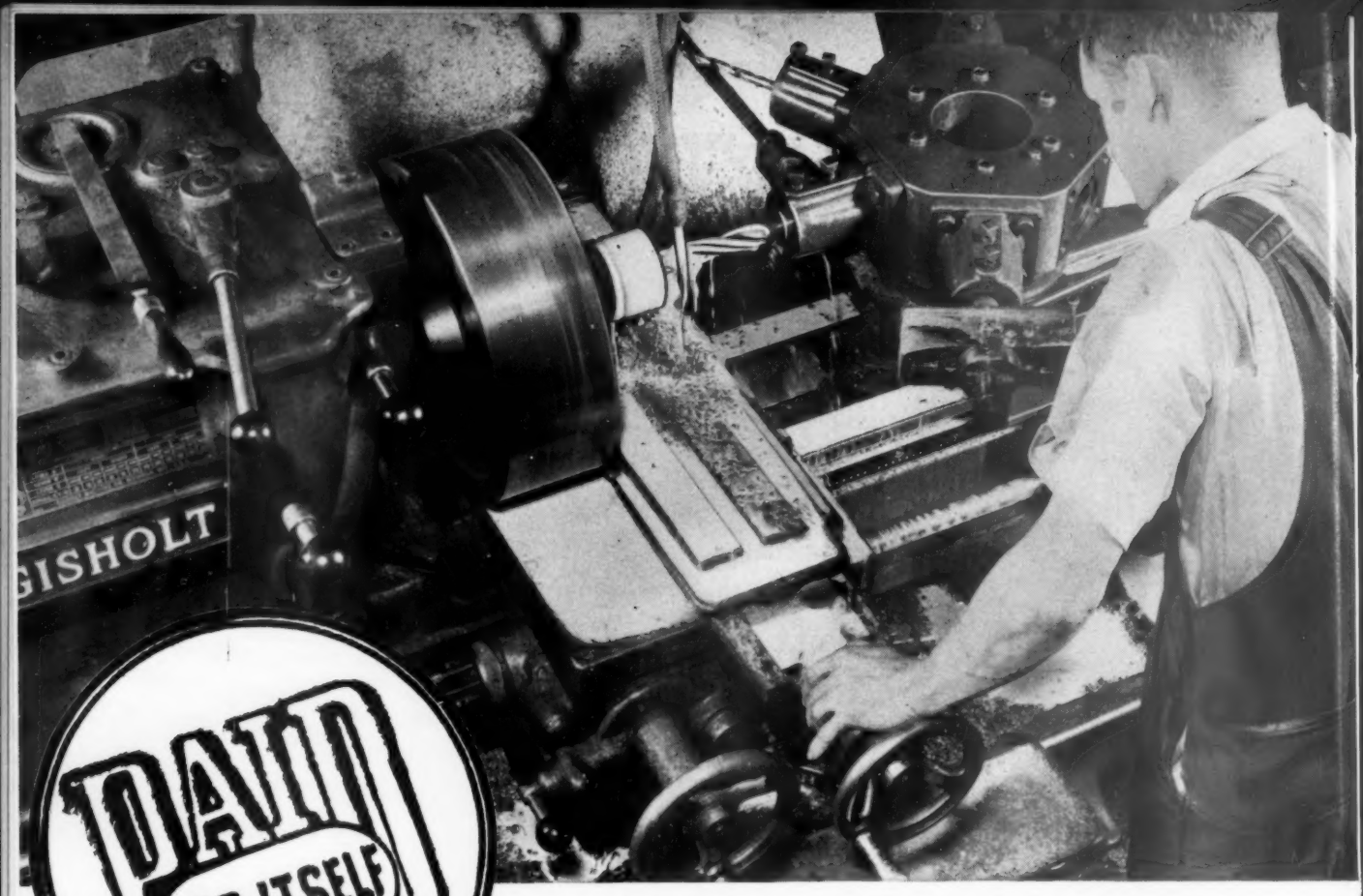
THE MONARCH MACHINE TOOL CO. SIDNEY, OHIO, U.S.A.

AGENCIES IN PRINCIPAL INDUSTRIAL CENTERS THROUGHOUT THE WORLD



IF IT CAN BE TURNED,
MONARCH CAN LIKELY TURN
IT BETTER AND FASTER

MONARCH LATHES



PAID FOR ITSELF

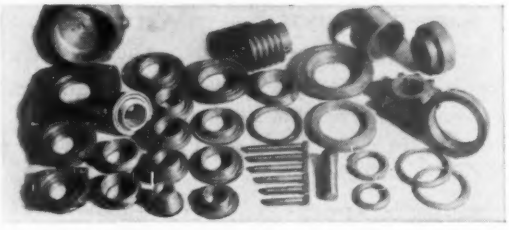
IN SIX MONTHS

—machining these miscellaneous small parts

● Here is a "spare time job" that paid for a machine in only six months! This manufacturer installed a Gisholt No. 5 Ram Type Turret Lathe to machine a particular part for portable rock crushers. The new machine did the work so much faster than heretofore that its spare time was turned to machining small parts formerly purchased from outside sources. Savings on these parts as shown, ranged from 30% to 70% of former cost. In fact, the savings on this work alone paid for the machine in six months.

Such savings are typical of what the new Gisholts are doing in many plants. Probably there are similar hidden profits for you in your plant. A Gisholt engineer will be pleased to help you locate them. Ask to have him call.

"YOUR SMARTEST INVESTMENT TODAY—BETTER MACHINE TOOLS"



★ *These small parts, machined on the new Gisholt, are used in this portable rock crusher.*

GISHOLT

GISHOLT MACHINE COMPANY

1229 EAST WASHINGTON AVENUE, MADISON, WISCONSIN, U. S. A.

TURRET LATHES . AUTOMATIC LATHES . TOOL GRINDERS . BALANCING MACHINES

Hidden Profits

Bring EXTRA Dividends to LIGHT Machinery Mfr.

THIS CARBOLOY-TIPPED CUTTER . . .
(For Face Milling Sewing Machine Bed)

Saves $40.29 every 128 pieces

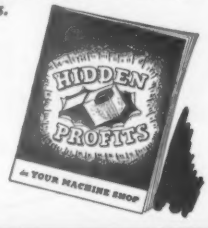
75% production increase—200% increase in pieces per grind—combined roughing and finishing operations—all these spell EXTRA PROFITS for this light machinery manufacturer. When you use Carboloy tools you are in a position to get these savings plus other "hidden" profits in the form of savings from less downtime, less scrap, better finish, greater accuracy, lower tool cost per piece, and less tool grinding time.

These savings are not confined to quantity production jobs alone. Nor are they limited to new, modern machines. Whether your runs are large or small, your equipment new or old, you'll profit through these "Hidden Profits" when you use Carboloy tools.

Write today for 24-page booklet of facts entitled "Hidden Profits In Your Machine Shop."

The Mark of CARBOLOY
REG. U. S. PAT. OFF.

Send for this unusual story of machine shop savings. Gives performance data on 30 typical jobs.



CARBOLOY COMPANY, INC.
11147 EAST 8-MILE STREET DETROIT, MICHIGAN

CHICAGO • CLEVELAND • NEWARK • PITTSBURGH • PHILADELPHIA • WORCESTER, MASS.
Canadian Distributor: Canadian General Electric Co., Ltd., Toronto

CARBOLOY CEMENTED CARBIDE TOOLS

CHAPTER DOINGS

(Continued from page 26)

facture of the various items. The meeting was so good it made headlines in the Chicago Daily News.

Toledo chapter had a grand meeting at the Toledo Yacht Club on October 3rd. Mr. A. L. Pashek, Technical Manager of Ohio Operations, Socony Vacuum Oil Co." gave a good talk on "Lubrication of Cutting Tools and Recent Developments of Cutting and Soluble Oils." A movie called "The Inside Story" was also shown. Where's Herb Tigges, Bob Haines, Glo Temple? Never see their names any more and your editor wonders why? Don't they attend any more?

One hundred thirty members and guests travelled to Sidney, Ohio, for the October meeting of Dayton chapter held at the Monarch Machine Tool Co. Visitors from Richmond, Ind., Middletown, Springfield, Piqua and Cincinnati, Ohio, were present for the meeting and to view this new and modern plant. After dinner was served in the cafeteria the group assembled in the plant auditorium and a short informal talk by Mr. W. E. Whipp, President of the Monarch Machine Tool Co. was heard. Chairman Johnson reported (not in detail) on the semi-annual, in Cleveland, but left it up to Vice Chairman Goodwin to welcome the visitors and outline the aims of the society and the qualifications for membership. The tour through the plant was of interest to all.

Oh! Man! What a time at the fall outing of **Hartford** chapter on October 12th. About 200 attended and enjoyed the clams, lobsters and all the fixings. A day of golf, sports, etc., preceded the dinner, at which the old fashioned band and barber shop quartets held forth. Commander Fife of the Submarine Base gave a wonderful talk on submarines and showed some fine pictures. Met this up-and-at-'em guy, Morris, in Cleveland. By me, he's oke.

About 100 members and guests attended the **Bridgeport** chapter meeting on October 12th in the Sun Room of the Stratfield Hotel. Sound Movies of the "Golden Gate Bridge" and "The Making of Steel" by the Bethlehem Steel Co. were enjoyed by all. Chairman Ben Page gave a brief talk on the semi-annual meeting at Cleveland. Of all miracles, Bran Shaw from New Haven and Herb. Perkins, one of our new policemen, attended again. Where's the rest of the old gang? E. Cooper from Yale and Towne and Bill Hoffman of the Bridgeport Brass take a lot of interest in the meetings. A lot of members regretted leaving so soon as beer and soft drinks were served. Door prizes were given out and Fred Lacey drew one.

On October 17th, **New York-New Jersey** chapter had a joint affair with the A.S.M. at the Robert Treat Hotel, Newark. Well over 600 heard Lt. Col. J. K. Clement, U. S. Army, speak on Industrial Preparedness. He cited the contract to Winchester Arms for the new Garand semi-automatic rifles. This instrument of defense and destruction was demonstrated by Capt. Floyd E. Dunn, of the 16th Infantry, New York. Evidently many of the boys had "shouldered a Springfield" because the barrage of questions after the talk portrayed much interest. Ed Davenport, A.S.M. Chairman, responded to the greetings of Herb Hall, A.S.T.E. Chairman. Incidentally Herb was feeling mighty fine because he had set himself up, the day before, as a Machine Tool Dealer.

The third annual Stag Outing, **Buffalo** chapter, was a "smashing" success. If you don't believe it ask three certain members. Ot Winter has other accomplishment besides factory management and tool engineering. He can play the Beer Barrel Polka on a banjo. Don Reep was presented with a pair of roller skates. Ask him why? Charlie Bruun won the bald headed contest and the main event outside of beer drinking was the Unique Citrullis Vularis Contest. The October meeting was very interesting. About 60 members had a chicken dinner and about 85 heard J. L. Williamson, Fellows Gear Shaper Company, give an illustrated talk on "New Development in Involute Gearing." A lively discussion followed the talk.

80 members and guests attended the October dinner meeting of **Racine** Chapter held in the main dining room of

(Continued on Page 62)

FEATURES OF P&J POWER-FLEX CONSTRUCTION

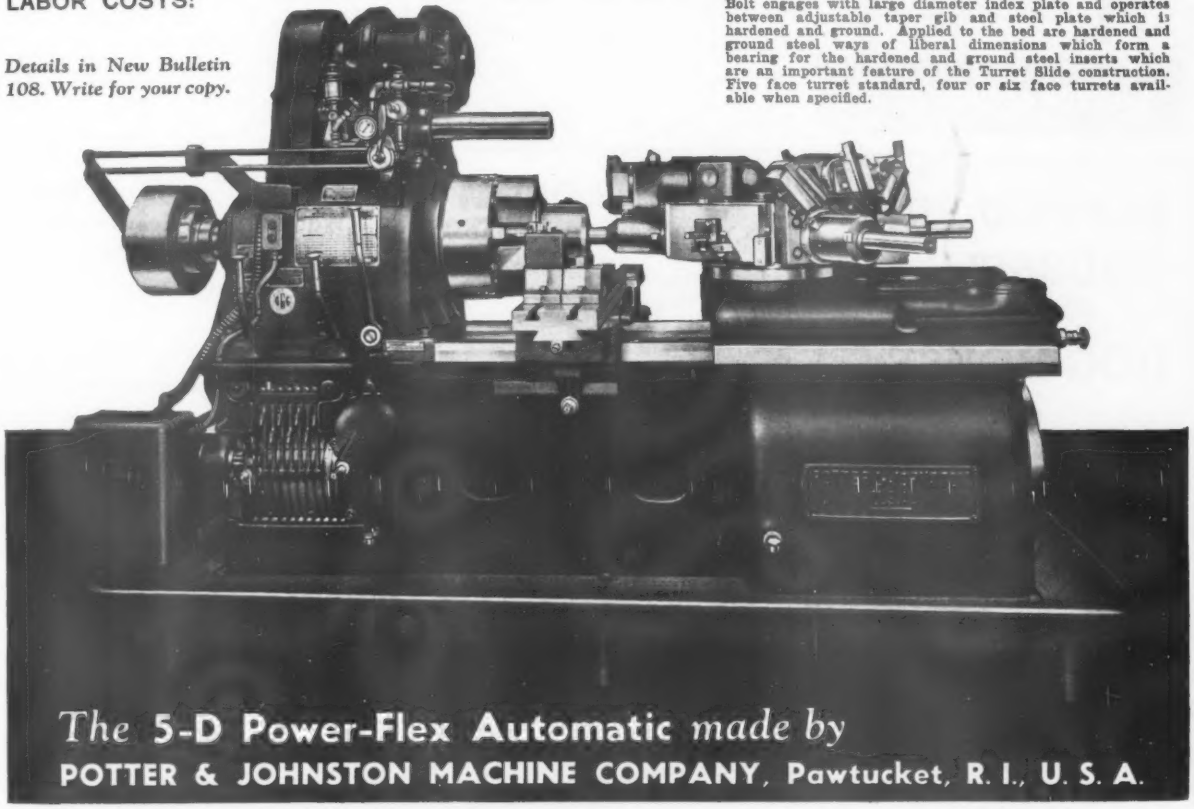
FOR THE 5-D AUTOMATIC CHUCKING AND TURNING MACHINE

TURRET and SLIDE UNIT

FEATURED in the insert is the P & J Turret and Slide Construction, an important contribution to the success of P & J performances! Other construction features, equally important, are: power—rigidity—four automatic spindle speed changes applied under load—three selective automatic changes of feed—automatic binding of turret following index—powerful and direct cross slide action—all these spell ACCURATE HIGH PRODUCTION PLUS DIVIDED LABOR COSTS!

Insert: P & J Turret and Slide Construction accounts for much of the increased production, as compared to ordinary machines of similar capacities. Liberal dimensions. Turret automatically clamped after indexing. Parts subject to strain are of alloy steel, carefully heat treated. Turret Lock Bolt engages with large diameter index plate and operates between adjustable taper gib and steel plate which is hardened and ground. Applied to the bed are hardened and ground steel ways of liberal dimensions which form a bearing for the hardened and ground steel inserts which are an important feature of the Turret Slide construction. Five face turret standard, four or six face turrets available when specified.

Details in New Bulletin 108. Write for your copy.



The **5-D Power-Flex Automatic** *made by*

POTTER & JOHNSTON MACHINE COMPANY, Pawtucket, R. I., U. S. A.

FACTORY REPRESENTATIVES: William L. Martin, Headquarters at Factory: New England States and Eastern New York and New Jersey; A. W. Stone, 986 Kenyon Ave., Plainfield, N. J.: Western New York and New Jersey, Eastern Pennsylvania, Maryland and Delaware; G. Tell DuBois, 8-154 General Motors Building, Detroit, Michigan: Michigan and the City of Toledo, Ohio; Louis K. Voelk, 14014 Woodworth Road, East Cleveland, Ohio: Ohio—with the exception of Toledo, and Western Pennsylvania: Harry I. Schuster, 743 N. Fourth Street, Milwaukee, Wisconsin: Illinois, Missouri, Wisconsin, Iowa and Indiana. **AGENCIES:** Star Machinery Company, 1741 First Street, South Seattle, Washington; Henes-Morgan Machinery Co., 2026 Santa Fe Ave., Los Angeles, Calif.: Jenison Machinery Co., 20th and Tennessee Streets, San Francisco; Wessendorff, Nelms & Co., Inc., 320 Franklin Ave., Houston, Tex.: Arthur Jackson Machine Tool Co., 60 Front Street, West, Toronto 2, Ontario; Arthur Jackson Machine Tool Co., 437 Grosvenor Ave., Montreal, Canada; Burton Griffiths & Co., Ltd., Birmingham, England; R. S. Stokvis et Fils, Paris, France: Rotterdam, Holland and Brussels, Belgium; Maskinaktiebolaget Karlebo, Stockholm 1, Sweden; Ing. Ercole Vaghi, Milano, Italy; Yamatake & Co., Ltd., Tokyo, Japan; (Imperial Export Co., 44 Whitehall Street, New York, N. Y.); Almacos, Zurich, Switzerland; Bourla Freres, Istanbul, Turkey.

INTER-CHANGEABILITY

(Continued from Page 20)

What I wish to bring to your particular attention is the extreme care which is used in the manufacturing of our products and also that no legitimate expense is spared in purchasing machinery and tools to effect highest quality.

Like many people technically-minded, I do not select the purchases of company machinery because the salesman is just a "good fellow" or that a machine is a machine. I must know what it will do; how effectively it will do the job; if it will conserve time over the present method; and one final important question—how it will stand up under the stress and strain of day in and day out use under maximum operations.

There has been much said by workmen and labor leaders regarding machinery and improved methods taking away their livelihood; however, I absolutely disagree with this viewpoint. The more each of us as individuals can accomplish by cutting costs in manufacturing, selling or transporting any products, the more it will increase the prosperity of the nation and each individual in it.

A notable example is the automobile industry, with its high production, interchangeability and efficient methods, which has brought the price of the machine, built under the old methods from $10,000 to $12,000, down to a cost of from $700.00 to $1250.00—and a much better car. These things also bring the automobile within the reach of the majority of people. In fact, I think inter-changeability will be advanced to such an extent before so many years that houses will be manufactured in factories, which will bring the home within reach of all of the people and will eliminate the hovels and shacks in some communities which I consider a menace and a disgrace to the American nation.

New Literature

of Interest to the Tool Engineer

Make your request for literature or information on New Equipment direct to manufacturers named, mentioning "The Tool Engineer."

● New Bulletins have been issued by the Sidney Machine Tool Company of Sidney, Ohio describing their new Sidney Lathes which were to have been shown at the Cleveland Show. The bulletins describe the herringbone gear transmission—a new feature of these new machines. Mention THE TOOL ENGINEER when requesting your copy.

● An interesting Application Chart has been issued by the Laminated Shim Company, Inc. This chart places in the hands of shim users a comprehensive survey of proved applications for laminated shims or shim stock.

(Continued on Page 52)

To Get EXACTLY what you want from Every Tooling Layout:

Insure *your recommendations before they leave your hands!*

Suppose you could find a simple, easy-to-use system that would

1. Let you forecast, *in advance,* exactly how any particular tool would behave in the tool room, in hardening and in production;

2. Provide a common language that would permit, *in advance,* a complete understanding between you and the tool maker as to exactly what was wanted from that tool.

Such a system would make certain that your recommendations were given the backing they deserve. You would know, *beforehand,* just how much wear resistance, toughness, hardening accuracy, and red-hardness each tool should have . . . and how to make sure it gets it. With a system like this, you will be able to avoid costly experiments and stop tool troubles *before* they occur. Reduced tool costs and production increases will naturally follow.

You can get this *advance* insurance with Carpenter's Matched Set Method of Tool Steel Selection. In more than 1000 plants, successful tool engineers, many of them in your own Chapter, use the Matched Set Method daily. Ask them to tell you how much the Matched Set Method means in getting better tool performance.

Send for your free copy of Carpenter's 60-page Matched Tool Steel Manual. It contains complete instructions and everything you need to know in order to apply the Matched Set Method in your plant.

THE CARPENTER STEEL COMPANY
Reading, Pa.

FREE 60-PAGE MATCHED TOOL STEEL MANUAL

THE CARPENTER STEEL COMPANY
122 W. BERN STREET, READING, PA.

YES, I am seeking new ways to speed jobs and reduce costs. Without obligation, send me a Free copy of your 60-page Tool Steel Manual that shows how to put your system to work.

NAME_____ TITLE_____

FIRM_____

ADDRESS_____

CITY_____ STATE_____

Carpenter
MATCHED
TOOL STEELS

NEW LITERATURE

(Continued from Page 50)

The applications listed are arranged for easy reference. Generous illustration of installation methods adds value to the chart as a handy guide. The chart is based on actual installation records—providing authoritative information over a wide industrial field.

● Carlyle Johnson Machine Co., Manchester, Conn., has issued a new 10 page clutch catalogue, descriptive of "Johnson Friction Clutches." A '39 edition, the catalogue covers all recent improvements as well as changes in prices.

● U. S. Tool Company, Inc., Ampere (East Orange), N. J., has issued Bulletin 36 which covers the complete line of U. S. Multi-Millers, high speed automatic production millers, which are designed for milling sewing machine parts, business machine parts, small arms, electrical and airplane parts, etc. An interesting note is that Multi-Millers can be used for production grinding operations, being interchangeable with a well known make of high speed grinding spindles.

● Carpenter Steel Co., Reading, Pa., has issued an interesting manual, Carpenter's Matched Tool Steels. It is comprehensive, replete with data and general information of vital interest to Tool Engineers; in addition, is pleasing in appearance and of good pocket size. Besides a wide range of tables, which includes hardness conversion tables besides the usual data on weights and measures, there are interesting sidelights on testing, heat treating and so on. There should be quite a demand for it.

● A new catalog featuring custom-built Solenoids, Coils and Transformers has been issued by the Dean W. Davis & Company, Inc., of 545 W. Fulton St., Chicago. Graphs giving technical information, plus illustrations of some of the many applications of solenoids, to modern machines are included. A copy of this catalog may be obtained by writing to manufacturer direct, or to this publication.

● A new chart giving the correct grade of Kennametal for machining twenty-one types of metals, together with recommended cutting speeds, has just been made available by McKenna Metals Co., 600 Lloyd Avenue, Latrobe, Pa. Materials listed include carbon steels, nickel chrome steels, nickel chrome molybdenum, chronium steels, high speed steels, Monel metal, free cutting steels and non-ferrous metals, in various states of hardness.

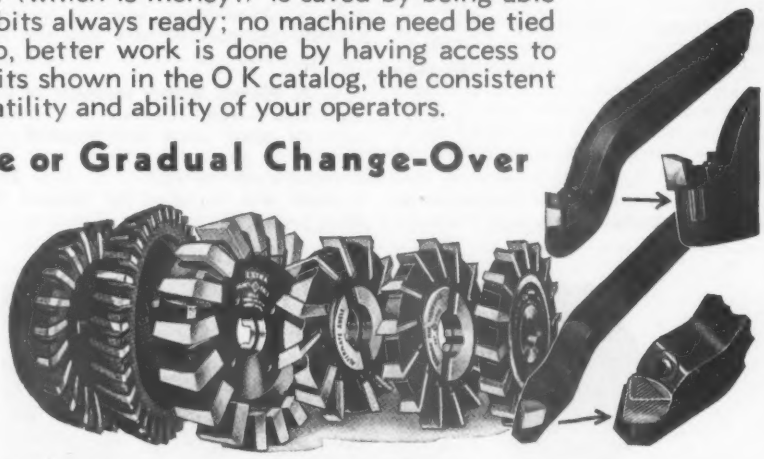
The reverse side of the chart contains practical data on how to machine with Kennametal and includes two designs for grinding tools to produce crescent shaped chips or coiled chips as desired; also, the correct tool shape for interrupted cutting with Kennametal. The new chart is printed on durable varnish cardboard stock and has a hole punched at the top so that it may be easily hung from the wall or lathe. Mention the "Tool Engineer," when writing for your free copy.

O K Metal Cutting Equipment is Self-liquidating!

INSTEAD of being an added expense, the O K System is an investment that begins to write itself off the moment it is installed. Compared with solid tools, the O K Inserted-Blade principle makes an immediate reduction in high speed steel cost. Much time (which is money!) is saved by being able to have spare sets of blades and bits always ready; no machine need be tied up on account of regrinding. Also, better work is done by having access to the wide variety of blades and bits shown in the O K catalog, the consistent use of which increases the versatility and ability of your operators.

Adapted to Complete or Gradual Change-Over

The O K line includes milling cutters, end mills, face mills, boring heads, reamers, counter bores, multiple operation set-ups, and single-point tools for lathes, shapers, planers, etc. Everything is here for your complete re-equipment — or, a machine or department at a time may be revised. On this, our engineering department will be glad to co-operate. Catalog on request.



THE O K TOOL COMPANY, SHELTON, CONN., U.S.A.

TRADE O K MARK

INSERTED-BLADE METAL CUTTING

TOOL SYSTEM

New ACHIEVEMENTS

★ NEW GORTON MASTERMIL . . . designed for duplicating multiple cavities and die sinking single cavities on work up to 30 inches square . . . has increased adaptability, capacity, and convenience in working plastic molds, die castings, and forging dies, large metal patterns, and tool work.

★ NEW SUPER-SPEED UNIVERSAL MILLER No. 8½-D which retains the desirable features of the previous model with important improvements.

★ NEW GORTON ACCESSORIES CATALOG which is a distinct contribution to the tool and stock room.

These are new achievements in precision, low cost production, and speed. They make possible new achievements for you in faster work, done better, more accurately . . . and at lower cost. Send us a piece of work to be done in our plant at no cost to you. We will supply complete time and cost data. Write today!

GEORGE GORTON MACHINE CO.

1111 13TH STREET, RACINE, WISCONSIN

PRODUCTION PERSPECTIVES

(Continued from page 24)

received within two days **by the Chapman Valve Company** of Springfield. According to company officials, production may not be increased though the size of the orders is unusual within such a short period. The orders are not in any way connected with naval construction officials say, though the European war has reflected a nation-wide increase in production which is being felt at the local plant. Orders for private companies which have government contracts have been asked on a "rush" basis because both the government and private industry are speeding through orders for shipyards.

Curtailed production at Westinghouse in East Springfield, at a time when the majority of industries in this area are picking up, **has resulted in the loss of a large number of workers** from the Westinghouse call list, some of whom have secured jobs outside of Springfield. Recently, it was learned, a number were given notice that their services no longer would be required at the end of the week and when the men were told a day or two later that the jobs would continue after all, several already had secured new jobs and refused to stay on.

C. A. Mayer, factory manager of the American Bosch Corporation of Springfield **for many years, has resigned** according to an announcement from the office of President Donald P. Hess. **The position will be filled by Edward H. Moll,** production manager. The position of production manager will remain unfilled for the present.

Incoming business has shown quite an increase during the last few weeks at the plant of the **American Bosch Company, Springfield and** the volume of **production now is reported to be much better than for some** little **time.** Employment also has increased. The concern's upturn is in all of its several lines, it was stated and is due in general to the business boom which has been evidenced in this country during the last several months. With the automobile industry looking forward to a banner year, Bosch also stands to benefit considerably as ignition systems, generator equipment and spark plugs are among its output.

In common with other concerns in the machine tool industry the Van Norman Machine Tool Co. of Springfield is so rushed with orders at present that it was just as well pleased with the cancellation of the annual machine tool exhibition which had been scheduled for Cleveland, James Y. Scott, executive vice president said. **Van Norman's plant is operating on two and a half shifts** at present **with** its **domestic business at a high mark** in addition to excellent export orders.

Perkins Machine & Gear Co. of West Springfield, **has taken over the Clark Paint & Varnish Co. plant, adjoining the Perkins plant and will remodel for expansion.** Officials say increased orders made necessary additional manufacturing space.

Springfield industry has contributed three of the five Army reserve officers now on extended active duty in the Hartford Ordnance District which has its headquarters in Springfield. Perhaps the **best known is Lieut. Col. Douglas B. Wesson** who recently resigned as vice president of the Smith and Wesson Manufacturing Co. **to devote full time to his work as chief of the general service of the ordnance district.** The **others are Capt. Alden Fretts** formerly of Chapman Valve **and Capt. Tracy Kerr,** formerly of the American Bosch.

Wickwire Spencer Steel Co. advanced wages and salaries of its employes about 11½ per cent, effective Oct. 8, **according to George W. Nelson, general superintendent. William A. Bennett, assistant superintendent, estimated 600 Worcester employes at the Goddard and Morgan Spring Works benefit.**

Worcester industrial activity continues the expansion which started the latter part of August. **The Wyman-Gordon Co. is instituting a night shift in another of its production departments,** due to the volume of business.

Heald Machine Co. of Worcester **is planning to add 30,000 square feet to its factory** floor space with an addition on the west end of the plant on New Bond Street.

Leland Gifford Co., Worcester has begun construction of a $58,000 addition to its plant. There will be a "substantial increase" in employment when the addition is completed, about Jan. 1, **ac-**

(Continued on page 62)

A Method for Simplified Compound Angle Analysis

By BYRON LINTON, Member A.S.T.E.
Bendix Products Div. South Bend, Ind.

HERE is a method of analyzing a compound angle problem in design so that any angle or length may be figured with a minimum of calculation. It is of particular benefit in layout work where it is desirable to find various angles quickly and, at the same time, with any required accuracy.

Briefly, the method consists of starting with the line of action—such as the centerline of a drilled hole—and laying out this line in its various positions, preferably keeping the angles to scale and the length of the centerline to some unit, as 1 inch or 10 inches. Then the angular and linear dimensions of the resulting positions are given in terms of arbitrarily assigned symbols. It is found that, from the beginning position, the various angles and sides of successive positions may be expressed in terms of previously used symbols. It is this resulting simplification that gives the method its value.

The method may best be explained by an example. Refer to Fig. 1, a simplified sketch of an adapter for an aircraft carburetor. The $\frac{3}{16}$ hole is to be drilled. Although dimensions for locating the hole are carried from face "A," it is desirable to rest on face "B" for the drilling operation in order to use a simple jig on a standard drill press.

A small sketch is made with the centerline shown in the positions shown on the part print as in Fig. 2. Since it is desired to find the angle between the centerline and face "B" of Fig. 1, further projections are made to indicate that angle as in Fig. 2.

In Fig. 2, then, view (C) indicates the section view of Fig. 1 in which the centerline is shown normal. This line is of unit length for purposes of analysis. The final view (E) also shows this line normal, or, of unit length. The required angle (ϕ) of view (E) is the required angle.

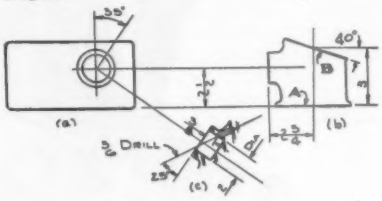


Fig. 1

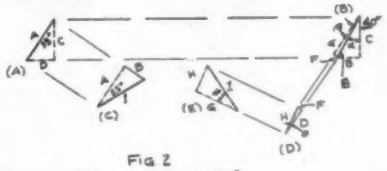


Fig. 2

$A = \cos 25°$ $\quad B = \sin 25°$

$C = A \cos 35° = \cos 25° \cos 35°$

$D = A \sin 35° = \cos 25° \sin 35°$

$$\alpha = \tan^{-1}\frac{B}{C} = \tan^{-1}\frac{\sin 25°}{\cos 25° \cos 35°} = \tan^{-1}\frac{\tan 25°}{\cos 35°}$$

$\beta + \alpha = 20°$

$$E = \frac{C}{\cos \alpha} = \frac{\cos 25° \cos 35°}{\cos \alpha}$$

$F = E \sin \beta$

$G = E \cos \beta$

$$\theta = \tan^{-1}\frac{F}{D} = \tan^{-1}\frac{\sin B}{\cos \alpha \tan 35°}$$

$$H = \frac{D}{\cos \theta} = \frac{\cos 25° \sin 35°}{\cos \theta}$$

$$\phi = \tan^{-1}\frac{H}{G} = \tan^{-1}\frac{\tan 35° \cos \alpha}{\cos \theta \cos \beta}$$

Check:

$$r = \frac{G}{\cos \phi} = \frac{\cos \beta \cos 25° \cos 35°}{\cos \phi \cos \alpha}$$

Thus the required angle (ϕ) may be found with only 4 steps; each step involving only the angular functions. Since the same two given angles, and in some cases the same functions, are repeated in these 4 steps, calculation may proceed rapidly and accurately.

Then, if it is desired to figure any of the lengths involved for checking or detailing purposes, this may readily be done by using only the known or figured angles in one step, to get lengths that correspond with the layout of Fig. 2. To get the actual lengths to put on the drawing it is necessary (usually) to calculate the length of the centerline between two "control" points of Fig. 1 (C), and correct any figured lengths by the ratio between this calculated centerline length and the unit figure taken in Fig. 2.

The layout for the tool would start with (E) of Fig. 2, with the centerline vertical and line (H) horizontal, and (ϕ) being the angle between the drilling centerline and a perpendicular to the face of the jig contacting the part. The complement of (ϕ) would then be the angle between the centerline and the base of the jig.

November Chapter Meetings

Chapter Meeting Announcements must be received on or before the 20th of preceding month to appear on this page. Members and friends of The Society contact Chapter Secretaries for meeting details if your announcement does not appear below.

BALTIMORE

November 12, 1939—Dinner 7:00 P.M. Technical Session 8:00. Sears Auditorium, North and Harford Avenue.

Speaker: A. H. d'Arcambal, Consulting Metallurgist, Pratt & Whitney Co.

Subject: "Cutting Tools and Gages," illustrated with specimens and slides.

Reservations: Mr. Stanley S. Johns, 806 Evesham Ave., Baltimore. Phone, Tuxedo 2127.

BRIDGEPORT

November 16, 1939—Dinner, University Club, Golden Hill Street. Joint meeting of the American Society for Metals, American Society of Mechanical Engineers and The A.S.T.E. at the Singer Mfg. Co.

Speaker: Mr. Marcollotti, of the Cincinnati Milling Machine Co.

Subject: "Metal Cutting." The latest information and methods unheard of before.

BUFFALO-NIAGARA FRONTIER CHAPTER

November 16, 1939—Dinner at 6:30. Technical Session, 7:30 P.M. University Club, 546 Delaware Ave., Buffalo, N. Y. Members, $1.10; Non-Members, $1.50.

Speaker: Herman Goldberg, R. G. Haskins Company.

Subject: "Taps and Tapping Machines."

CLEVELAND

November 10, 1939—Dinner, 6:00 P.M. GTV Club, 1622 E. 55th St.

Speaker: H. P. Wilkinson, Sales Engineer of National Acme Co.

Subject: "The Reclamation of Cutting Oils by National Acme Centrifugals."

Reservations: Please send in your Reservation Cards for Dinner.

DAYTON

November—6:30 P.M. Watch for Monthly Bulletin.

Speakers: Pres. Jim Weaver, Doctor Allan A. Bates, Metallurgy Research Director, Westinghouse Corp.

Subject: "Securing and Developments in Metallurgy."

Reservation: By card.

DETROIT

November 9, 1939—6:30 P.M., Dinner, $1.50 per plate. Webster Hall (Starlit Room). Technical Session, 8:00 P.M., sponsored by General Motors Institute.

Speaker: Guy J. Bates, of the G. M. Institute.

Subject: "Better Methods Start with the Tool Engineer." (Illustrated with sound pictures.)

ELMIRA

November 17, 1939—Hotel Langwell, Elmira.

Speaker: Herman Goldberg, of R. G. Haskins Co.

Subject: "Taps and Tapping Machines."

NEW YORK - NEW JERSEY

November 14, 1939—Dinner, 6:30 P.M.; meeting, 8:00 P.M. Robert Treat Hotel, Newark, N.J.

Speaker: W. A. Hart, Chief Engineer, Colonial Broach Co.

Subject: "Design and Application of Broaching Tools and Fixtures."

Reservation: Ben Brosheer, Medallion 3-0700.

(Continued on Page 60)

NOVEMBER CHAPTER MEETINGS

(Continued from Page 58)

PITTSBURGH

November 10, 1939—Dinner, 6:30 P.M. Price $1.25 per person. McCann's Dining Room, Ferry and Diamond Sts., Pittsburgh, Pa. Dinner talk—to be arranged. Meeting, 8:00 P.M.

Speaker: Mr. I. J. Snader, Chief Engineer, Ex-Cell-O Corporation, Detroit, Michigan.
Subject: "The Development and Application of Thread Grinding."
Special prices for parking. Your secretary will appreciate the prompt return of all cards. Have you got your new member yet?

ROCHESTER

November 15, 1939—6:20 Dinner, Todd Union. Technical Meeting, 7:45 P.M. Lower Strong Auditorium of University of Rochester, River Campus.

Speaker: E. P. Grismer, of the R. G. Haskins Co., Chicago.
Subject: "Taps and Tapping Machines." Demonstrations of high-speed tapping will be given.
Reservations: Write or phone C. H. Wallace.

ROCKFORD

November 9, 1939—Faust Hotel. Combination meeting with the National Officers Reserve Association of the United States Army.

Speaker to be announced later. Twenty-two exhibitors already have been given space. Looks mighty good.

SCHENECTADY

November 13, 1939—Rice Hall, General Electric Co., Schenectady, 8:00 P.M.

Speaker: Herman Goldberg of the R. G. Haskins Co.
Subject: "Taps and Tapping Machines." Mr. Goldberg will use tapping machines in connection with his talk.
Members are invited to bring guests.

ST. LOUIS

November 9, 1939—Plant tour through the Carter Carburetor Company at St. Louis.

(Continued on Page 61)

NOVEMBER CHAPTER MEETINGS

(Continued from Page 60)

SYRACUSE

November 14, 1939—Dinner meeting at Syracuse Industrial Club.

Speaker: Mr. Herman Goldberg, of R. G. Haskins Company.
Subject: "Taps and Tapping Machines."

TORONTO

November 10, 1939—Dinner, 6:30 P.M. Roberts Restaurant, 747 King Street, E., Hamilton. Tickets $1.00 at the door.

Speaker: E. W. Forkner, Federal Machine & Welder Co.
Subject: "Welding for Tooling Purposes."

Tri-City

November 1, 1939—Dinner, 6:30, Fort Armstrong Hotel. Technical Session, 8:00.

Speaker: George M. Class, Manager of Engineering, Gisholt Machine Co.
Subject: "Automatic Lathe and Turret Lathe Tooling." He will also illustrate his lecture with slides and pictures of actual installations in the field.

TWIN CITIES

November 8, 1939—Dinner, 6:30, Dunwoody Institute. Technical Discussion—Tungsten-Carbide and its applications. Practical demonstration on grinding problems.

YORK
(Central Pennsylvania)

November 14, 1939—6:30 P.M. Dinner, West York Inn, West Market St. and Highland Avenue, York. Business Meeting at 7:30 and Technical Session at 8:00 P.M.

Speaker: Millard Romaine, General Sales Manager, Cincinnati Milling Machine Co.
Subject: "Some of the Factors Influencing Selection of Tooling Equipment with Examples of Modern Tooling."
Reservations: For dinner, to be made with Lewis H. Richter, care of York Corrugating Co., York.

CHAPTER DOINGS

(Continued from page 48)

Hotel Racine. W. R. Oelschlager of the International Harvester Company gave an interesting talk on "Deisel Engines." He also presented a sound movie showing the Deisel Engine in manufacture and operation. An interesting discussion followed.

100 members and guests attended the October meeting of **Philadelphia** Chapter. Connie Hersam gave an interesting report on the Semi Annual meeting. Ed Glenn gave a short talk on the Tool Design Course sponsored by the chapter. Twenty-five students have enrolled for the first year. Ralph Flanders spoke on Thread Grinding and an interesting discussion followed. Two movies were shown by the Standard Oil Company.

Detroit Chapter waved its October meeting due to the Semi Annual at Cleveland. Chairman Thiede, Secretary Diamond, George Whitehouse, Clyde Hause, were among those seen at the dinner. Floyd Eaton, Ford Lamb and Charlie Staples were also there.

In spite of the heat, **Baltimore** Chapter had 100 members and guests at their October meeting. Messrs. Cameron and Mullen gave an interesting talk on "Development of Polaroid Glass and its Application in Industry."

The Public Speakers Club is in full swing and the boys are getting over the jitters. They don't expect to make any great speakers, therefore, there will be no politicians blossoming forth.

York Chapter held their October meeting in Waynesboro. About 130 members and friends attended. They have hopes of creating a new chapter in Waynesboro. Chairman Reed presided. G. Leeson reported on the semi annual, R. E. Wentzler outlined the workings of and the importance of A.S.-T.E. York's slogan is, "Let's go places, make Waynesboro another chapter."

On October 12th, **Milwaukee** Chapter visited the Ampco Metals Inc. plant after hearing Mr. Walter Edens deliver a lecture on "Modern Non-ferrous Metals and their Application to Tools and Tooling. "Waukesha Motors had a complete delegation in attendance. One of the members is in Japan and mailed a card stating, "It ain't so."

PRODUCTION PERSPECTIVES

(Continued from page 54)

cording to Albert J. Gifford, secretary-treasurer. The plant addition is being built to "meet the normal increase of such times as we are having. There has been a pronounced increase in business over a few weeks ago." The work on the addition is being speeded to have it enclosed before cold weather. Equipment at a cost not yet estimated will be purchased for the plant addition. "Employment increase," he added, "will be for both skilled and semi-skilled help."

A few other manufacturing plants, notably **Norton Co.** and **Curtis & Marble Machine Co.**, Worcester, Mass. **note increased business** but officials declare it is not due to the war. **Norton Company has been recalling employes for some time. Norton Company's machine department is "going very briskly," according to Clifford S. Anderson,** secretary. "We are pleased" he said "because a bigger proportion of the business than before is domestic." He said there had been "no effect" of the war yet on the company's business. The abrasive division, he said, was progressing gradually but the wheel section of the division is slowing up.

Frank A. Ball, president **of the L. S. Starrett Co.** Athol is **named chairman of the board** of directors, a new position, and David Finlay, vice president and general salesmanager is named president, it was announced from the company offices. The new sales manager is W. J. Green and **Arthur H. Starrett, second vice president is elevated to first vice president** in the executive department changes. The new member of the board is G. S. Hoag, of Boston.

Nineteen Pittsfield Mass. manufacturing concerns gained only a negligible number of employes, but they employed 1,313 more persons than in 1938.

Contracts for the design and **construction of an addition for the Cleveland Punch & Shear Works Company** at Cleveland, **have been awarded.**

(Continued from page 28)

the spindle bearings when the machine is started.

The machine can be equipped with a built-in cutter coolant pump mounted on the inside of the bed and driven by chain from the table feed power shaft.

An automatic backlash eliminator, which must be built in at the factory, can be supplied at extra cost.

The machine weighs, when equipped with the standard cabinet base, approximately 1450 lbs.

The floor space occupied by each machine is approximately 13.9 sq. ft., which makes it possible to group several makes in a small area.

Gairing Micro-Nut Adaptor

An interesting device that should meet a ready acceptance has been developed by Gairing Tool Co., Detroit. Known as the Micro-Nut, it is an accessory adaptable to either single or multiple spindle machines, claimed to quickly and accurately set cutting tools to their correct length and, in the case of multi-spindles, in correct relation to each other. A micrometer dial permits adjustments from .001 to .020, accomplished by an adjustable nut feature that works independently of the screw. The relative position of the cutting tool can be extended or retracted and measured adjustments accurately determined without interference with tool set-up. Provision is made to extend beyond the .020 graduation, the micrometer dial being used for final precision adjustment.

The makers claim that the Micro-Nuts, when used in connection with any standard adapter assembly, or with tool holders and boring bars, will give the operator everything he has had before, with a speeedy, precisioned accuracy that saves time and work spoilage. Gairing Micro-Nuts are available for all sizes of standard adjustable adapters, and can be furnished special when needed.

B & S Thread Chasing Attachment

Brown & Sharpe Mfg. Co. announces a Thread Chasing Attachment for use with B & S Nos. 00,00G, 0, 0G, 2 and 2G High Speed Automatic Screw Machines which are designed to meet all requirements of a wide variety of work. The attachment permits rapid production of more than ordinarily accurate threads, particularly form, lead and pitch diameter. Gear driven from the spindle, the device assures synchronization between spindle rotation and operation of the attachment. The chasing tool is carried on a double slide mounted on front cross slide, and the thread is produced by several passes of the tool along the work, cutting in one direction only, as in chasing on a lathe. Incidentally, the tool carrying mechanism operates only while cutting threads.

Change gears permit cutting threads from 13 to 40 per inch, and from 0.5 to 2.5 millimeters lead. Arranged to cut either right or left hand threads at any set-up, the spindle may run forward or backward, as desired. The Attachment has many interesting features, fully described in a Bulletin, and warrants further consideration by toolers for mass production.

J & L New Fay Automatic Lathe

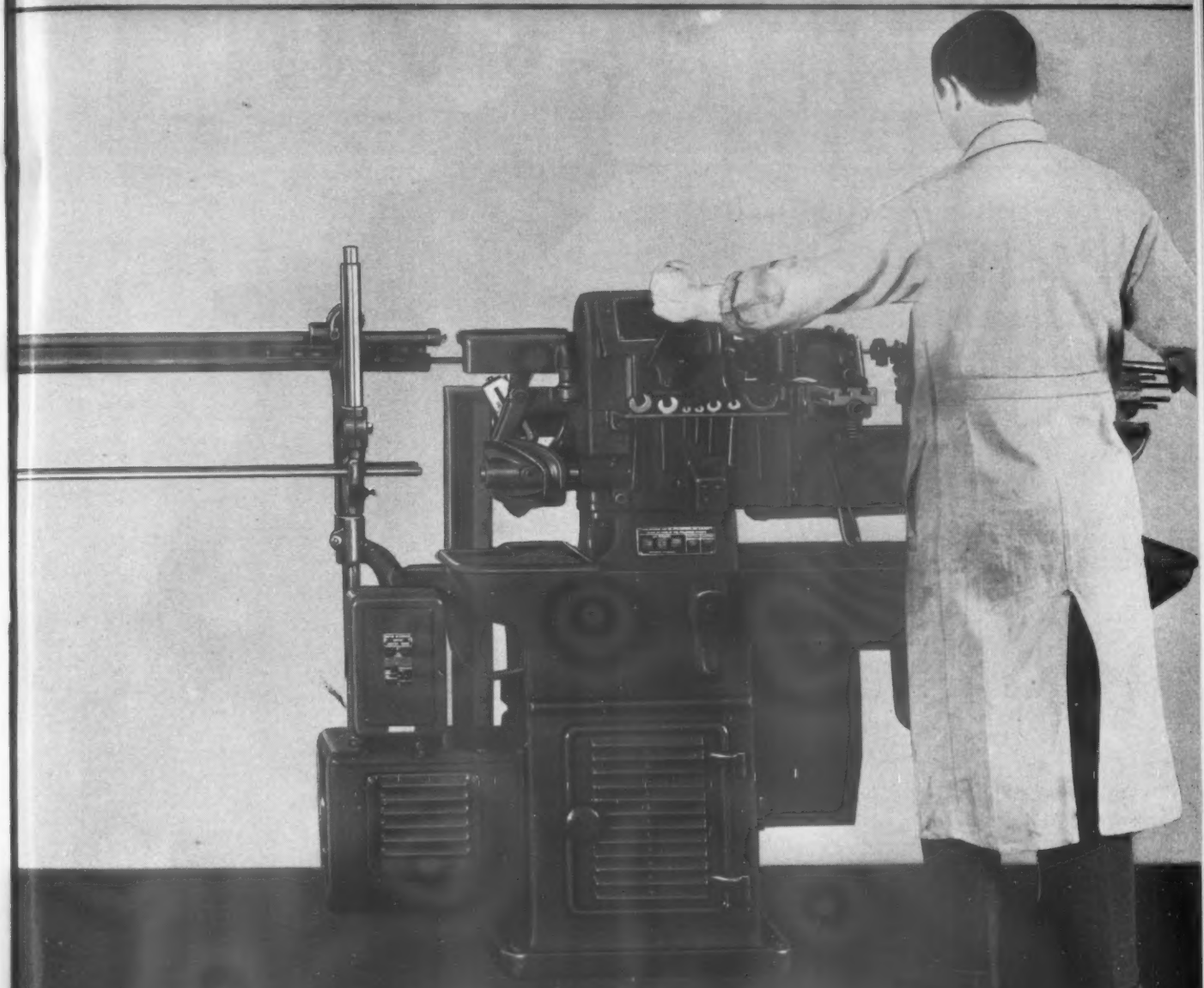
Jones & Lamson Machine Co. is out with a new 16" Fay Automatic Lathe, a modern, heavy duty machine designed to take full advantage of late hard alloy cutting tools. It can operate in excess of 50 HP indicative of its stamina under stress of high production. The machine is provided with an extra large chip pan, will swing 12½" over carriage and 17½" over center and back bars, and can be furnished in five standard lengths with centers capacities of 23, 35, 53, 71 and 89 inches respectively. It has eight spindle speeds, ranging from 28 to 180 RPM with standard change gears. The close-up view here shows the spindle and slides, tooled for rough turning and facing a cluster gear. With carbide tipped tools, makers claim actual cutting cycle for this operation to be 15 seconds.

Forty years ago an automobile cost six times as much per pound as it does today, and ten times as much to operate it—thanks to the Tool Engineer.

Advertisers' Index

MODERN Wire Feed Screw Machines

Profitable- for Short Runs and Second Operations



Quickly set up—
Simple to operate—

Three sizes-Nos. 0, 1 and 2
Motor and Overhead Drive

DETAILS ON REQUEST

B·S BROWN & SHARPE MFG. CO.
PROVIDENCE, R. I., U. S. A.

BROWN & SHARPE

A WINNING PAIR—

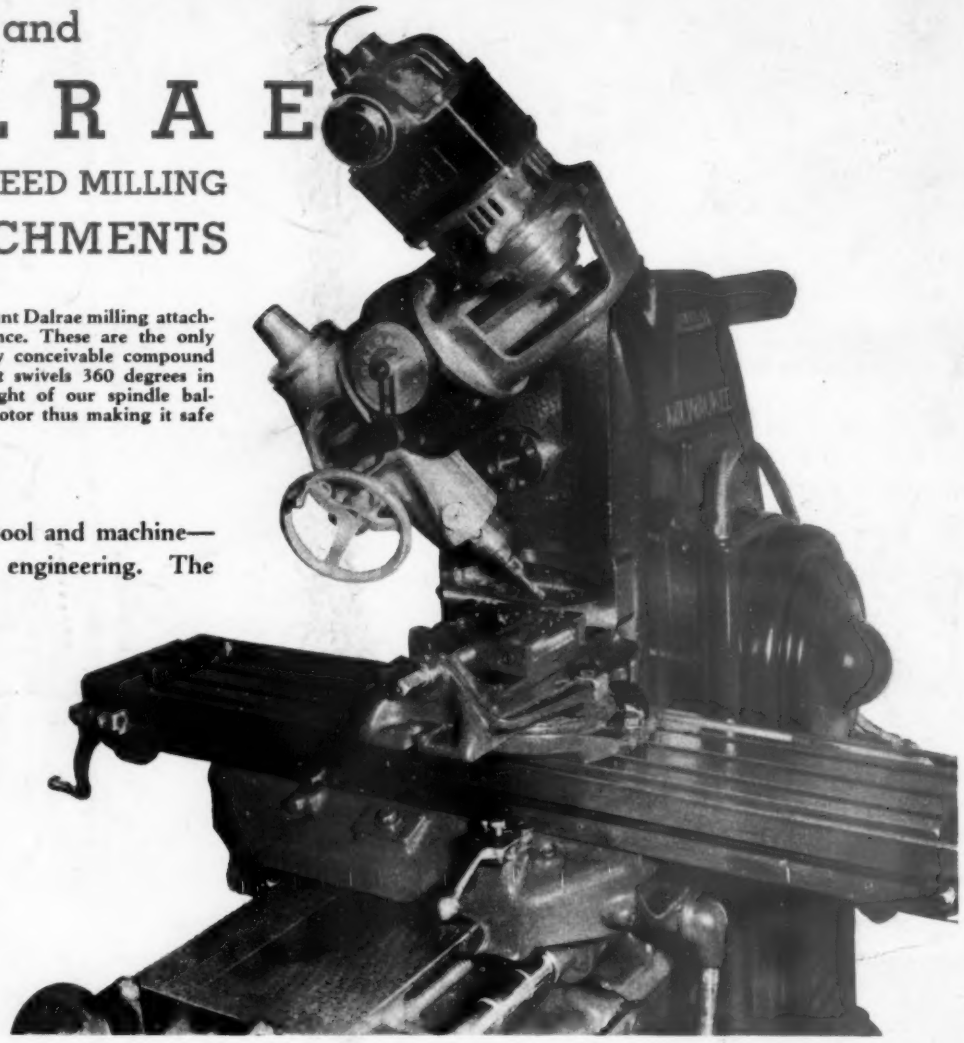
YOUR END MILLS

and

DALRAE

HIGH SPEED MILLING ATTACHMENTS

It is only necessary to mount Dalrae milling attachments on the overarm once. These are the only attachments on which any conceivable compound angle can be obtained. It swivels 360 degrees in either direction. The weight of our spindle balances the weight of the motor thus making it safe when mounting.



Get the most from tool and machine—for successful tool engineering. The Dalrae Midgetmill is especially designed to get the most from small tools by providing the correct high speeds they need for most efficient operation. Attach the Midgetmill to the overarm and get the correct high speeds that mean smooth, clean, accurate work and long tool life. Of paricular advantage is the "Thou-Meter," which gives a continuous reading in thousandths of the depth at which you are working—as described and illustrated at right.

Close-up of the "Thou-Meter," showing a setting of exactly 2.500". To use the "Thou-Meter," merely touch tool to work, set dial at zero, and mill, drill and bore until dial shows correct reading—in thousandths. The "Thou-Meter" is accurate to ±.00025" in its 2½" of travel.

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